COMPUTERWORLD

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Weekly Newspaper

Second-class postage paid at Boston, Mass., and additional mailing offices

Price: $9/year | November 8, 1972 | Vol. VI No. 45

NEWSPAPER

NEWS IN BRIEF

Court 'Slaps' Learson For Discussing Suit

NEW YORK – IBM Chairman T. Vincent Learson last week received a verbal rebuke from a federal district court judge here for publicly discussing the Justice Department vs. IBM antitrust suit.

At the same time, Chief Judge David Edelstein of the Federal District Court for the Southern District of New York promised to act soon on the IBM request for an early trial on certain issues raised by the suit [CW, Oct. 25].

Under a court order issued last year at the request of IBM itself, employees of the parties to the suit are barred from commenting on the case without the court's permission.

But despite this IBM-sought ban, Learson told a group of financial executives recently that the breakup of IBM sought by the Justice Department would "never happen," a remark which received wide publicity.

Software Programmer Salary Nears Systems Analyst's

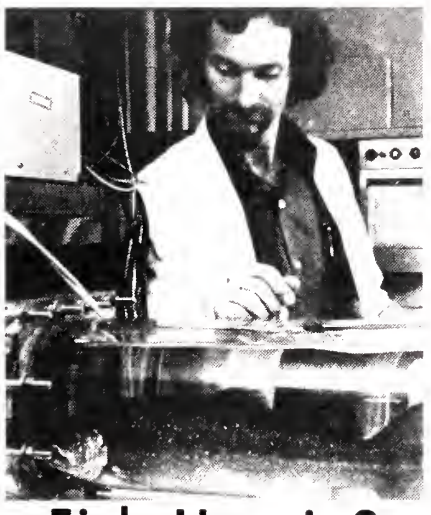
LAKE BLUFF, Ill. – Systems analyst salaries have historically run about 15% ahead of those for programming positions of an equivalent skill level. But this year, for the first time, the "programmer" positions were separated into applications positions and software positions, and software programmer salaries appear to be roughly equivalent to systems analyst salaries.

This is one of the conclusions of the 1972 Weber Salary Survey on Data Processing Positions in the U.S.

The survey figures indicate that the software positions are being compensated only 2.3% below systems positions of equivalent skill level and some 11.7% above equivalent applications programming positions.

Information on the survey is available from Philip H. Weber Salary Administration Service, A.S. Hansen, Inc. 1080 Green Bay Road, Lake Bluff, Ill., 60044.

On the Inside This Week



Fish Utopia?

Results of laboratory experiments at the U.S. Bureau of Fisheries in Michigan, like this one which gauges effects of water temperature and flow velocities on lake trout, are correlated by computer. Through such data gathering, fish planting and other corrective programs, scientists hope to achieve a return to a self-sustaining balance of life in the deteriorating Great Lakes.

Impact of Ascii Focus of NBS 6-Month Study

By Don Leavitt
Of the CW Staff

WASHINGTON, D.C. – The National Bureau of Standards has launched a six-month study to determine the significance and impact of Ascii (American Standard Code for Information Interchange) as a federal DP standard.

Under the federal standard, all new computers and related equipment brought into the federal inventory after mid-1969 were supposed to be compatible with Ascii, with the obvious hope that such compatibility would facilitate the swapping of information and programs between DP centers.

Federal Information Processing Standards Task Group 12 (TG-12), convened last week by Dr. Ruth Davis of NBS, has until May 15, 1973, to survey users both in and out of government and to make its report.

Dr. Robert R. Johnson, vice-president of Burroughs and a member of the National Academy of Science evaluation panel for NBS, is chairman of the new group.

Though focusing on the use of Ascii within the government's DP operations, the task group's findings are expected to have implications for the entire DP community. Ascii has been a voluntary national standard since 1963.

Representative Jack Brooks (D-Texas), author of the legislation under which NBS has established the federal standards, recently wrote Davis that "any suggestion that the studies . . . might . . . lead to abandonment or compromise of the Ascii should be dispelled without any delay.

"Having developed this standard," Brooks continued, "the computer community should see that it is implemented, recognizing that, as in the case of any

(Continued on Page 2)

Networks Prepared

Election '72: Biggest Test For DP Prognostication

By E. Drake Lundell Jr.
Of the CW Staff

NEW YORK – Only 10-years-old, computer-based prognostication of election results gets its biggest test this week as all three national television networks struggle to be the first to tell voters whom they have elected.

This year's computer operations of the networks are the largest in their history, as is only fitting for this most computerized campaign of all.

The combined networks have spent well over $11 million on this election to correlate the national election returns and predict the outcome.

But even though computer-based prediction has been used in its present form since the off-year election of 1962, there still remain some basic philosophical questions about its effectiveness and use.

History Outlined

The prototypes for this year's systems were first used in the 1960 presidential race, but were notoriously inaccurate with both ABC and NBC first awarding the election to Nixon and later changing to Kennedy.

The next major test came in 1964, but the Johnson landslide that year was not a good test since the results were known early. The early "call," however, in that case raised the question of whether the networks should use computers to predict the outcome of the race before the polls had closed in some states – a question that is still with us.

The 1966 off-year congressional races are interesting because ABC predicted eight races wrong, a record that still stands.

The politicians, pundits, pollsters and prognosticators had their last big test in the 1968 race between Humphrey and Nixon and the results showed they had learned some lessons.

The operators of the systems had learned to put accuracy before speed. Therefore all of the networks called the presidential race correctly, but slowly.

The first prediction came from ABC at 8:19 a.m. the next morning, when it awarded Illinois to Nixon, giving him enough electoral votes to win. NBC followed two hours later and CBS was in the place position at 11:50 a.m.

Systems Split

Basically the networks use two different computer systems for their election coverage spectaculars.

The first is a massive operation run by News Election Service, a cooperative venture of the three networks plus the nation's two major news-gathering organizations, the Associated Press and United Press International.

The networks get their "raw" vote count from NES which has around 140,000 people feeding the results from 175,000 election precincts into six regional computer centers. The "raw" vote count is not used in the network's projections, but is displayed on the tote boards or directly on the TV screen.

From the six regional centers of NES the vote totals of around 550 nationally important elections (governorships, congressional races, senate races, the presidential race) are forwarded to two separate computer centers in New York.

The redundant centers here are an innovation, instituted after some problems appeared in the programming of the one center in 1968.

But the NES totals are only "raw" totals. They do not give the network's prognosticators an indication of how the

(Continued on Page 2)

How Much for a Used Computer? Better Watch the Changing Times

By a CW Staff Writer

"How much is my used computer worth?"

That question has been plaguing computer users and computer industry people for years – and it's a question that will intensify in the future.

Many users planning to install newer equipment are selling used equipment and they need to know what is a fair market price.

Even the users that sell equipment through a broker need to know whether they are getting fair market value and which brokers are offering them the best realistic deal available.

Making the Old New

On the other side, many users have found that older equipment – particularly 360 equipment – can be beefed up with the addition of independent memory and peripherals and therefore can be a good buy.

These users need to know the market price for used equipment so they can determine whether it is economically competitive with newer equipment.

Both sets of users – those selling and those buying – need to have a feel for the trends in used computer prices. If the trend is down, a user might want to sell earlier than he had planned. If it is up, the purchaser might want to buy earlier than planned.

Today the question of a used computer's worth cannot be answered with any degree of assurance – prices fluctuate sharply month by month and depend to some extent on geographic area and whether the user sells the system through a broker or on his own.

Generally, however, it appears that the prices for used 360 systems currently have stabilized at about half of the original IBM purchase price.

International Data Corp. reports that a recent survey of users found the average price was approximately 44% to 45% of

(Continued on Page 4)

Application Deadline for CDP Exam Extended 30 Days

By Edward J. Bride
Of the CW Staff

PARK RIDGE, Ill. – Uncertainty over the value of academic vs. practical experience has brought a 30-day extension – to Dec. 1 – of the application deadline for the Certificate in Data Processing (CDP) examination.

The extension was required to process applications already filed under the "academic equivalence policy" adopted by the Data Processing Management Association (DPMA), which administers the CDP program.

The CDP exam will be given Feb. 13 in testing centers across the country and elsewhere, and the 1973 test will be the first time the academic equivalence will be permitted, DPMA said.

When the association's Certification Council met late last month, council members had difficulty in clearing the hundreds of applications, especially those which were attempting to have some academic credit accepted in lieu of experience qualifications, DPMA reported.

Without this credit, five years in a computer-based information systems environment are required before a person is eligible for the test.

The council cited the following example of academic equivalence: An individual with a Bachelor's Degree in computer science from a "suitably accredited institution" plus two years of practical experience in computer-based information systems would be eligible.

Case-by-Case

Don MacPherson, DPMA education director and ex-officio member of the certification council, would not elaborate on other equivalencies, noting each application is being considered on a case-by-case basis.

The content of a degree must be evaluated, he cited. In other words, heavier weight is given to DP courses, and to management and business courses, since DPMA is primarily a business-oriented association, MacPherson said.

The extension of the deadline was a technical move to permit the CDP Credentials Committee, whose decision is final on these matters, to rule on the equivalencies, DPMA said.

Declining to estimate the number of applicants this year, MacPherson said the total changes daily by "hundreds," and on the deadline day in the past, as many as 800 applications have been received at headquarters, 505 Busse Highway, 60068.

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Second-class postage paid at Boston, Mass. and additional mailing offices. Published weekly (except: a single combined issue for the last week in December and the first week in January) by Computerworld, Inc., 797 Washington Street, Newton, Mass. 02160.

25 cents a copy; $9 a year in the U.S.; $10 a year in Canada; all other foreign, $25 a year. MARGARET PHELAN, *circulation manager.* Four weeks' notice required for change of address. Address all subscription correspondence to circulation manager, Computerworld, 797 Washington St., Newton, Mass. 02160.

W. WALTER BOYD, *publication manager.* PATRICK J. McGOVERN, *publisher.*

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NBS Launches 6-Month Study on Ascii Impact

(Continued from Page 1)

move toward progress, there will be disruptions and sacrifices."

Specific Issues

Despite these concerns for the larger DP community, the TG-12 study will focus on quite specific issues. Federal users have already been surveyed to determine the extent of Ascii implementation. The current study will look at associated conversion difficulties and "other related matters," according to NBS.

The standard calls for the use of Ascii whenever data is exchanged by installations which have equipment conforming to the standard.

TG-12 will try to determine the extent to which Ascii is specified in these situations.

The group also wants to examine the use, permissible under the federal standard, of subsets and extended sets of the basic Ascii character

The federal standard provides set procedures for obtaining waivers on implementing Ascii. The effectiveness of these procedures for standards management will be studied. The standard also calls for existing DP systems to be converted to Ascii "on an evolutionary basis" as equipment is replaced, reprogrammed or redesigned. TG-12 will determine the extent to which that guideline has been followed.

From these basic studies and the comments of users, vendors and interested observers, TG-12 will draw its conclusions.

Brooks, in his letter to Davis, noted, for example, that "experts, whose judgment we respect, but with whom we do not necessarily agree," suggest two limitations that "quite possibly" have affected implementation of the Ascii code.

First, he said, "they" see most modern computers working on an 8-channel basis, whereas Ascii is described as a 7-channel code. "Logic demands that Ascii be considered as an 8-channel code of 256 characters, 128 of which are unused at this time," according to Brooks' informants.

Communications Tool?

The second technical consideration which Brooks said had been called to his congressional subcommittee's attention is the implication that Ascii is primarily a communications tool. If that idea persists, he said, the impact of the standard will continue to be "most seriously compromised."

John L. Little of Davis' staff at the NBS Center for Computer Science and Technology is the executive secretary of TG-12.

Election '72: the Biggest Test

(Continued from Page 1)

vote is going in what they call "key" precincts around the country.

Individual Operations

So to keep tabs on voting in these key areas, the networks each run their own poll-watching operations backed up by other computer and communications gear.

Of the 175,000 precincts, each network has chosen around 3,000 that it considers "key" in predicting how 80 million U.S. individuals will vote. NBC, for example, uses around 2,700 key precincts, while CBS gets results from about 3,200.

In using the key precinct system the networks use several methods, all fairly complex. Basically, however, they break the country down by voting blocks and then project the results from one or several key precincts representing those blocks to that entire population segment or grouping.

For example, if a key precinct, consisting of a suburban area with a high white, protestant ethnic content and median income of around $10,000 per year, indicates those voters are going 90% for one candidate, then the system would project that other such areas would show a similar pattern within a certain range.

The computer systems operated by the networks also compare the results shown in the key precincts in the present election with the results from the same precincts in previous elections to detect trends and developments.

This year most of the precincts used by the networks are new from the 1968 election. Both NBC and CBS have scrapped almost all of the "bellweather" precincts used in 1968, but ABC has only changed around one-third of their precincts, perhaps happy about being the first to call in 1968.

Questions Remain

The question of whether or not the networks should predict the results of any races before all the polls are closed still remains and the practice is now being discussed by the Federal Communications Commission.

NBC and ABC have promised not to call any state races before all the polls are closed in those states, but CBS said it might call some of the races, even if some polls were still open.

But all of them will call the presidential contest as quickly as possible.

In 1964, for example, the networks were able to predict the presidential outcome with only a small fraction of the votes counted and while people were still going to the polls in the West.

Most critics feel this practice influences the outcome in the areas where polls are still open. For example, they say that supporters of a candidate might not go to the polls if the networks have already called their man a loser – and vice versa.

But while the questions will be raised, no one contests the fact that this will be the biggest computerized effort ever.

And how accurate are the networks? Despite ABC's 1966 blunder, the networks have a remarkable record.

For example, one network has "called" around 1,600 races since its first real test in 1962. It's been wrong only four times.

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On the near horizon, another Ampex breakthrough in semiconductor engineering – the ARM-158 and the ARM-168.

Disks. The new DS-330 subsystem to match the IBM 3330 has a capacity up to 1600 megabytes with 16 drives. This system, with complete plug-to-plug compatability with IBM 370 systems, is faster and easier to change, and offers operators greater convenience.

Tape drives. Ampex pioneered tape and tape drives – and has led the industry in sophistication ever since. The TM-34/TC-38 is typical with totally compatible flexbility. The TM-34, replacing 3420, 2420 and 2401 tape drives, has all the advantages of IBM 3420 drives, including speeds up to 200 ips. The TC-38 controller is compatable with all future changes in IBM OS through controller microprogram updating without hardware changes . . . PLUS superior error-correction capability.

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Discs. The Ampex DS-8430 disc subsystem is a high-performance alternative to either UNIVAC disc or drum systems. The DS-8430 has a radial interface to provide disc operation with proven FASTRAND software. This disc subsystem may also operate in a FASTRAND emulation mode, providing all the advantages of removable discs.

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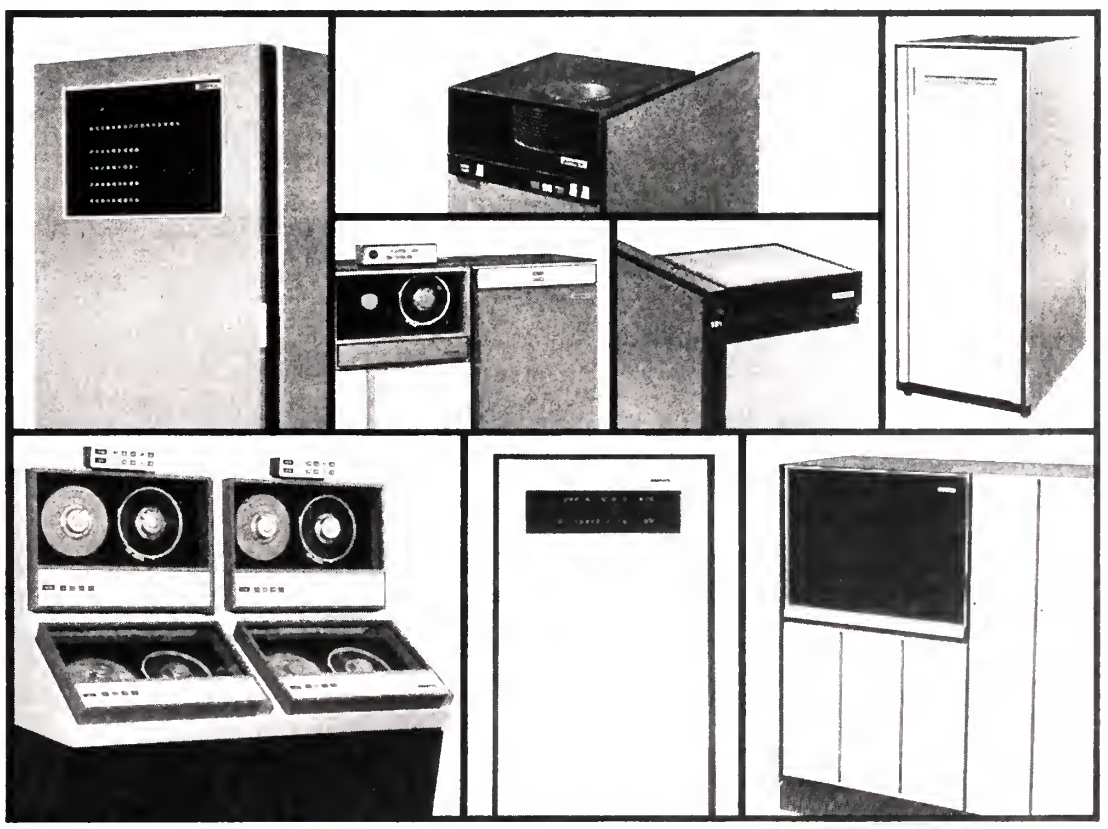

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Used Computer Questionnaire

(1) Please list all used computer equipment, by make and model number, that you have bought or sold since Jan. 1, 1972, whether on your own or through a computer equipment broker. If the sale was for a complete system, please list make, model and date here and the total price under question number 3.

CPUs

		Make	Model	Number	Date	Price
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					

Peripheral Equipment

Disk Drives

		Make	Model	Number	Date	Price
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					

Tape Drives

		Make	Model	Number	Date	Price
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					

Printers

		Make	Model	Number	Date	Price
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					

Other (Please Specify)

		Make	Model	Number	Date	Price
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					
Bought	☐					
Sold	☐					

(2) Was the transaction for a complete system? ☐ Yes ☐ No
(3) If so, what was the total price? _____
(4) Did you use a broker on the transaction? ☐ Yes ☐ No
(5) If so, what was the broker's commission? _____
(6) Would you recommend that other users use a broker? ☐ Yes ☐ No
(7) Why or why not? _____

(8) Other comments _____

Name (for identification only) _____

Company _____

Address _____

Telephone _____

Your comments will not be attributed to you unless you are contacted by a *Computerworld* reporter first – for permission or clarification.

DP and the Handicapped – Part I

What Is Known Must Be Put Into Action

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. – Computers and other developing information technologies can serve to help "de-isolate" severely handicapped and other "homebound" individuals from the community at large by providing new employment opportunities and other contacts with the outside world.

Almost everyone in society is handicapped to some extent by the lack of usable useful information, but the severely physically handicapped are the "cutting edge" that will make the rest of society realize the need for home-delivered information, participants agreed at a recent workshop on the "Homebound Person and Cybernetics: Closing the Loop of Information."

"Recent technological advances in telecommunications, information processing and programmed instruction offer many new opportunities to severely handicapped and homebound persons who, because of limited mobility, have been barred from meaningful, gainful employment and the chance to become self supporting," according to Dr. John Noble Jr., director of research and evaluation in the Rehabilitation Services Administration of the Department of Health, Education and Welfare.

"The feasibility and cost effectiveness of preparing severely handicapped individuals for microform and data processing jobs that pay decent wages in the competitive marketplace have been demonstrated," he stated.

"What is now needed is a plan which translates what is known into action.

"Job markets," he said, "impacted by these recent technological advances must be systematically exploited on behalf of the severely handicapped and homebound. This includes training severely handicapped individuals for the new jobs and getting employers to accept them as employees."

This is the first in a series of articles on how computer technology can provide employment opportunities for the physically handicapped individual who is confined to his home. Part I discusses some ideas for future opportunities that will be opened by the spread of computer-communications networks. Part II will report on a project which has proven conclusively that severely handicapped persons can be trained effectively to become programmers and data-entry personnel.

Rodney Lay of Mitre Corp. noted the basic need today is to develop systems "capable of getting information into the home quickly and efficiently" for both employment opportunities and for educational purposes.

Presently, the participants agreed, the greatest drawbacks are economic, not technical.

"It is possible technically to develop systems to allow people to work at home," Lay said, but he warned that the cost of such systems would be high.

"Such systems will only be economical," he indicated, "if they are done for the entire population. This will help the handicapped by bringing the total price down to a level they can afford."

At present there are around 1.5 million to 2 million physically handicapped homebound individuals, Thomas R. Shworles, assistant research professor of medicine at George Washington University, noted.

With the proper training and the right information delivery systems, he said, the physically disabled worker can compete equally with other workers especially in such areas as proofreading, programming and editing.

"Groups of physically handicapped persons can be envisioned working as information assistants who could accomplish a great deal," according to Paul Zurkowski, executive director of the Information Industry Association.

"With appropriate telephone or Telex facilities they could obtain access to needed journals and books. Less educated individuals can also be visualized learning citation indexing and operating key stations.

"As society develops new systems and institutions around information-generating activities, new vocational, educational and social experiences will evolve for the homebound and once isolated person," he predicted.

How Much Is Your Used Computer Worth?

(Continued from Page 1)

the original purchase price, and the "Blue Book" published by Time Brokers Inc. indicates about the same price range for used 360 equipment.

But several sources have noted the overall average cannot be applied across-the-board to used computer equipment.

For example, one source noted there was a great demand for used 360/40s about four months ago, which caused the price to remain relatively stable at around 55% to 60% of the original IBM purchase price.

At the same time, the people involved in selling used equipment note there are times when the market becomes "glutted" with certain pieces of equipment – particularly older tape and disk drives – which forces the prices down.

Future moves may drastically affect the prices of such equipment, the sources noted.

For one thing, there seems to be a trend developing among users who might be expected to upgrade to a 370/155 or 370/165, a trend of holding onto 360 equipment.

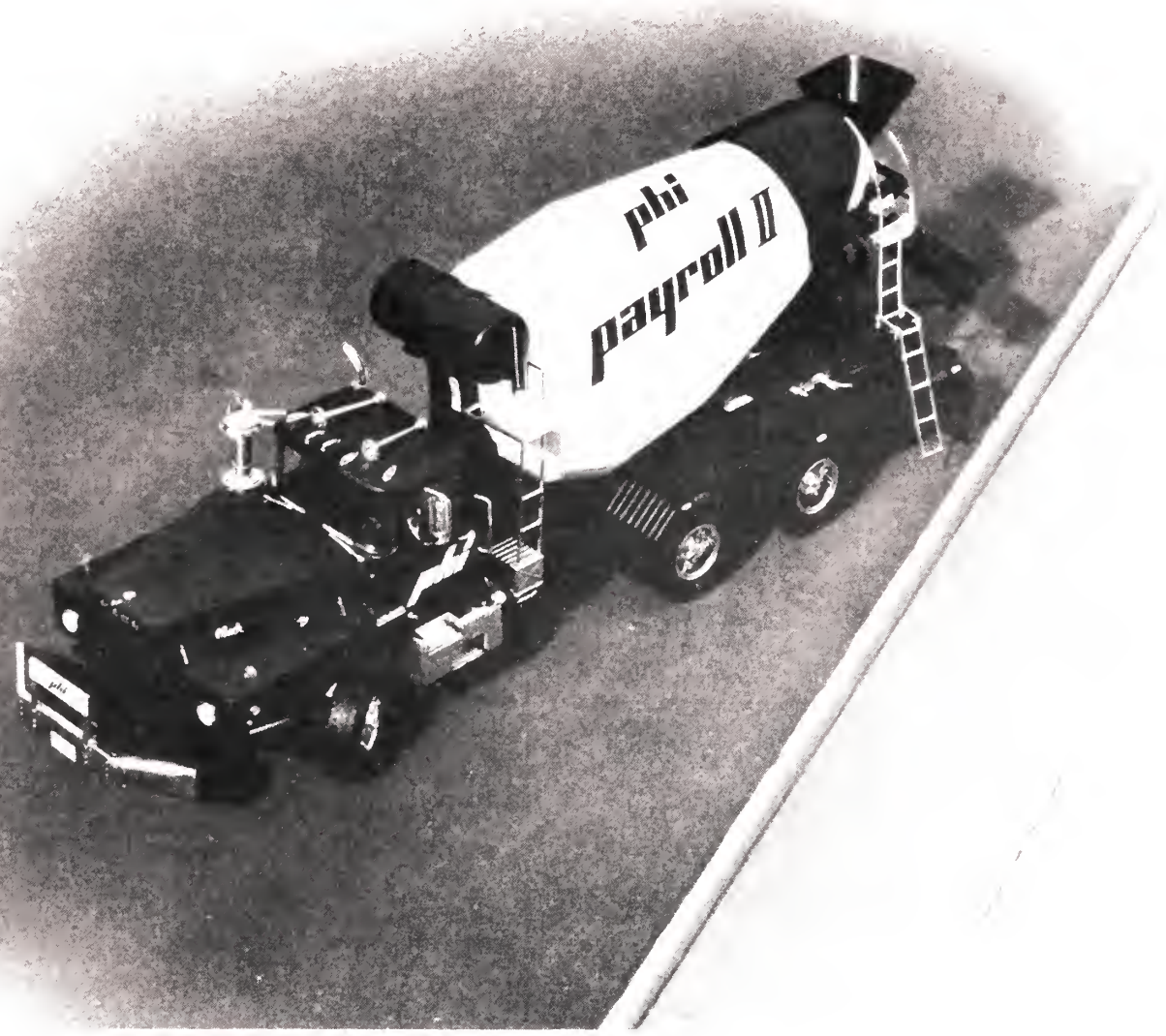
These users, who have apparently decided to hold old equipment at least until the 370/158s and 370/168s become available late next year, are not selling their used machines. In fact, they are sometimes going to the used market to purchase additional 360 equipment to meet their increased processing needs until the new machines are available.

Another action that could affect the market strongly would be one or more leasing companies deciding to sell their entire 360 inventories in order to get out of the leasing business.

If this happened in the next two or three years, the effect on the used marketplace could be "catastrophic," causing prices to plummet to extremely low levels, the sources said.

To help users gauge the worth of used computer equipment, *Computerworld* is initiating a survey of used equipment prices with this issue.

The results compiled from the accompanying questionnaire will be published at a later date to help the user answer the question: "How much is my used computer worth?"



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The Professional's Viewpoint

Computer Foundation Formation Questioned

The recent announcement of the intention of the Association of Computing Machinery and the Data Processing Management Association to form a "Computer Foundation" [CW, Oct. 11] to represent the interests of the entire DP community without further discussions outside the executive councils of the two organizations has been challenged by professional leaders as well as by individuals in the Letters to the Editor column [CW, Oct. 25].

Two viewpoints on this personnel certification are given here, and in each case the authors request community response.

Nelson Cyr is a member of the DPMA in Los Angeles and a director of the National Board of the Association of Computer Programmers and Analysts. Hamilton Armstrong Jr. is President both of the Syracuse Chapter of the ACM and the Society of Professional Data Processors.

Is It Representative?

Such a computer certification foundation will no doubt impact the entire industry. That being the case, it seems reasonably safe to assume that many people in the DP and business community would be extremely interested in the initial formation of the foundation, the scope and implications (or impositions) of its charter and the representative nature of the foundation charter members.

While the DPMA/ACM article states that other societies and representatives from business and industry are members of the study committee proposing the new foundation, does anyone outside of the DPMA and ACM know who these participants are? What areas are they representing and how many? Just how representative of the existing societies, businesses and industry are these study committee members?

I cannot help but feel that a foundation such as that being proposed should be widely representative of all of the societies, businesses and the industry as a whole.

Will the DPMA/ACM charter guarantee this? Or will the charter designate, for instance, that only CDP holders can officiate on the chapter board?

Would it not be more equitable and representative to *insist* that the foundation charter allow *no more* than two members from any one society to serve on the board at one time? And could not such a foundation get wider acceptance and representation by allowing at least one representative on its board (with equal vote) from any computer society, business group or specific area of industry – DP *and* otherwise?

If you agree that the computer certification foundation charter should be publicized, and be made subject to revision, if necessary, to ensure equitable participation and representation, please mail any comments to me via The Professional's Viewpoint Page. – Nelson J. Cyr

Guilt by Association?

The joint announcement of ACM and DPMA indicates that immediately after the next ACM Council meeting in Los Angeles next month ACM may be contractually involved in setting up a "Computer Foundation" that its members have not been able to discuss among themselves – never mind approve.

While this type of decision-making may appeal to ACM President Anthony Ralston, it does not appeal to me.

I, for one, do not want to be associated with the CDP exam and its ridiculous requirement of five years' practice before one can even sit for it.

I believe that people who are practicing data processing are entitled to sit for DP certification without such a long wait. Perhaps Ralston, with his university faculty background, may believe in the absolute requirement of four or five years' waiting.

Moreover, I get distinctly suspicious when, for the second time, as an ACM financial crisis is suddenly discovered and members are being made to suffer, a contract of unknown proportions is quietly pushed through by the ACM leadership without adequate membership knowledge.

I want to let the ACM Council at next month's meeting know that its membership – and the profession as a whole – does not want it to approve the Computer Foundation without a lot more data being made freely available, with discussion of the pros and cons.

If you agree with me, please write me your opinions which can then be forwarded. Please state whether you are an ACM member.

Letters should be addressed to Hamilton Armstrong Jr. and sent to the Professional Viewpoint Page. – H. Armstrong Jr.

Editorial

A New Dialog

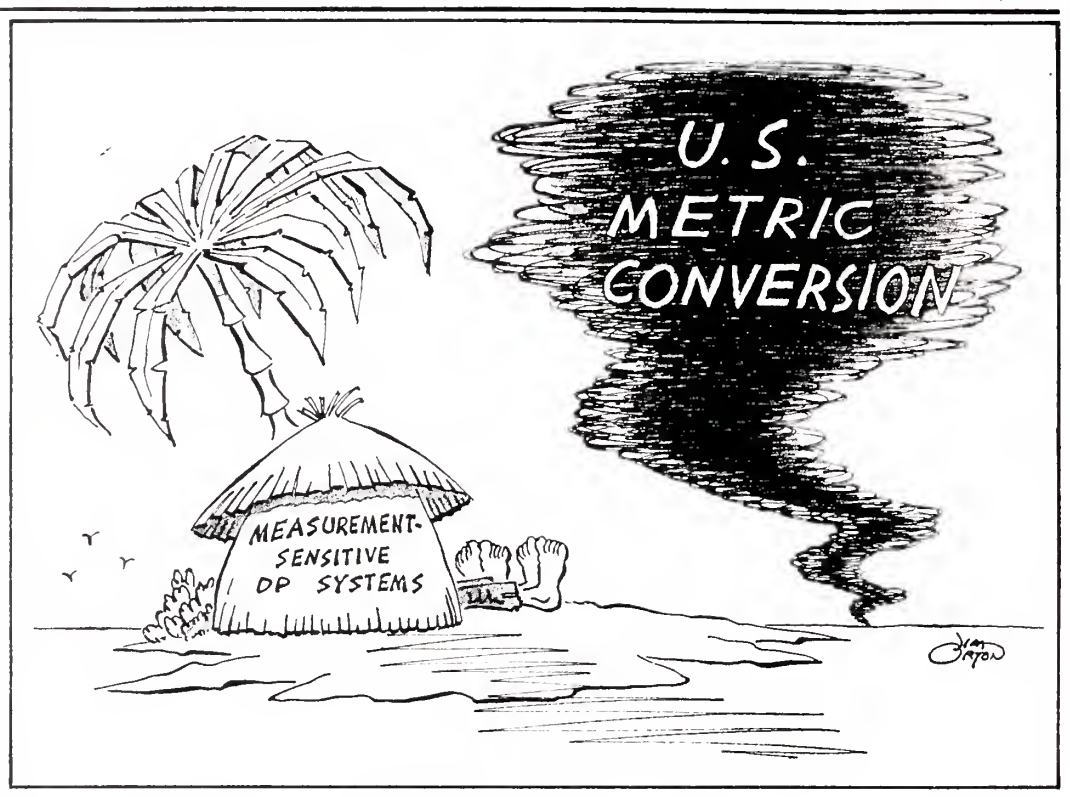
The first International Conference on Computer Communication demonstrated that a successful conference must simply meet the needs of its attendees.

The ICCC was sponsored by the IEEE, the IEEE Computer Society and the ACM. And refreshingly the three societies should enjoy a profit from this venture into the computer communications area.

ICCC attracted experts from the professions of law, economics, medicine, management and others. Many of these attendees, while experts within their own disciplines, had never before sat down to discuss common computer-related problems with their counterparts.

The international theme of the conference gave those attending a global look at what is happening in computer communications. It undoubtedly fostered an interdisciplinary dialog that is bound to continue.

Computer developments have occurred much faster than improvements in communications, Hopefully, the ICCC will help to speed new developments in the latter area.



'Do You Feel a Breeze?'

Letters to the Editor

'Overhead' Can Have Many Definitions

We would like to clarify references to the word "overhead" in your article "Manufacturers Urged to Include Monitors as Basic System Tools" [CW, Oct. 18].

The article refers to our paper entitled "Hardware Measurements of Resource Utilization of a Batch Computer System," by P.M. Russo and A.D. Robbi, which was presented at Compcon '72.

The numbers in the article were derived from the following figures, which are averages over several runs: % user state CPU time – scientific, 31; commercial, 15. % CPU idle time – scientific, 49; commercial, 82.

If we define % non-idle CPU overhead to be 100 minus % user state CPU time minus % CPU idle time, we obtain the figures presented in the article. They are misleading without the above figures since if a CPU does nothing, i.e., % idle time = 100%, we have zero overhead!

The "overhead" referred to later in the article refers to essentially source program length-independent activity such as console typewriter and system disk activity. Note that this is quite different from the first notion of "overhead."

A digest of our paper was published in the Compcon '72 proceedings, which is available from IEEE, Order Department, 345 E. 47th St., New York, N.Y. 10017 for $15 for IEEE members and $20 for non-members.

Dr. Paul M. Russo
Dr. A.D. Robbi
RCA
Princeton, N.J.

What Do Firms Need?

In response to the article by Cashman and Shelly [CW, Oct. 4], we, the instructors of data processing, are making constant efforts to provide our students with the type of educational programs which will meet the needs of employers. However, we are confronted by a lack of criteria employers seek in prospective employees.

I feel the professional societies, such as the DPMA, should draft an overall set of specific data processing skills for two- and four-year college programs.

Our usual response from employers is, "Well, we want a bright kid who can handle himself in our DP shop," instead of, "We want an employee who can develop the logic for a mag tape file update," etc.

Our programs should not be overstructured, of course, but some specific guidelines from "the other side" would be most helpful.

If anyone has specific employment objectives designed by an employers' group, I would appreciate a copy.

Hal Ferguson
DP Department
Business Division
State University of N.Y.
Morrisville, N.Y.

Mailing Help Due

Alan Taylor is doing a commendable job of focusing attention on some of the foolishness in the design of computer-produced documents from utility companies intended for the public. Perhaps he could continue the good work by examining *Computerworld* itself – the Oct. 11 issue arrived on Oct. 18 with the address label neatly obscuring part of a front page news item.

Further, since *Computerworld* abandoned envelopes, some issues have arrived in deplorable condition.

J.E. Bates
Director
University Management Systems
McGill University
Montreal, Canada

We have been very much aware of delivery problems in Canada for some time now. And we have been taking special steps to correct the situation.

Effective with the issue dated Nov. 1, 1972, Computerworld will be folded, wrapped and individually sacked for each city in Canada. The Canadian postal authorities assure us these procedures should reduce late delivery problems.

Please keep us posted on changes in service. Ed.

U.S. Needs IBM to Compete Overseas

By David E. Ferguson
Special to Computerworld

Viewpoint

King Solomon didn't mean to kill the baby, he just took the most expedient means of solving a problem. The Justice Department's proposal to bust up IBM, however, is much less sophisticated.

It actually intends to carry out the execution.

Its action affects the entire computer industry and the entire economy.

The small systems market, virtually non-existent prior to the System/3, would feel the impact first. Smaller users are generally newer to the business, more geographically dispersed and are, therefore, more dependent on the support IBM is able to provide.

The proposal to bust up IBM is not new. The question is how. Busting it up along vertical lines would give the largest mainframe, peripheral, software and service companies.

Busting it up horizontally into, say, six companies, would result in Univac being the seventh largest computer company with little chance of becoming number six.

But why bust IBM up at all? It is claimed this will stimulate competition. A rapidly expanding industry now spawns a lot of new companies, many of which are poorly conceived and managed.

There are too many companies in the computer business that are profitable and expanding; too many industries created by IBM such as peripherals, leasing and software, to be fooled by this argument.

The intention behind antitrust legislation is protection of the consumer. This, indirectly, provides protection to competitors.

But our antitrust legislation is oriented to domestic commerce, whereas in fact, we have a world economy. Last year the U.S. had a trade deficit of about $2 billion.

One way to combat a trade deficit, and one which we have tried, is to lower wages (through devaluating the dollar). A more positive approach is to enable our companies to compete more effectively overseas instead of hampering them.

In attempting to explain our trade deficit, Gerald Larsen (*Datamation* Forum – July '72) claimed our foreign competitors are "unwilling to make our investment in technology but . . . take advantage of lower labor costs."

That hardly seems to be the case, even in the examples he cited. For instance, he stated: "The Japanese . . . invented neither radio nor television nor even the color TV tube, and look what's happened to the consumer electronics industry in the U.S." The Japanese have made a long list of contributions to basic electronics, one of the most prominent being Leo Esoki's invention of the tunnel diode.

Larsen, president of Unicorn Systems, goes on to ask, "When was the last time Volkswagen was innovative?" Now, if innovations are measured in terms of racing stripes or bigger chrome bumpers, VW comes near the end of the line. However, last year's VW had 25 innovations, including the "computer plug" which will become standard on American cars as soon as they take servicing as seriously as VW.

With regard to labor costs, both countries rank high on the list of top wage rate countries with West Germany in the top five and Japan about the same as the UK.

The reason for the success of the Japanese electronics industry and the German auto industry is clear. With government support they made innovative products designed for market acceptance at a low price made possible through mass production.

This has resulted in creating jobs, contributing to their country's favorable balance of trade and has created a large number of suppliers and subcontractors.

IBM also has in fact created an industry where there was not one before, and it represents one bright spot in the balance of trade. It has competition, primarily from peripheral manufacturers, core manufacturers, DP suppliers, and will eventually receive stiff competition from a software product industry that did not exist before unbundling.

The reason IBM does not have competition for mainframes is that there are no large effective competitors. It is not accidental that the first companies to become profitable in the computer industry were IBM, DEC, Control Data and SDS – all computer companies. They had to make a profit to survive.

Sperry Rand, GE, RCA and Honeywell were not computer companies. Most of their revenue came from non-computer-related products.

Eventually the U.S. will experience increased competition from foreign computer manufacturers. Rather than hobble our industry's ability to compete at home and abroad, I hope IBM is still around so the U.S. gets its share of jobs and revenue. That's the best way to protect the consumer!

Ferguson, president of Group/3 Inc. and author of a CW column for System/3 users, was a participant in an antitrust action against IBM over unbundling while he was president of Programmatics Inc.

Costs Only Relative

Traditional OCR Problems Passé in Today's Market

By David F. Tierney
Special to Computerworld

Computerworld's Sept. 27, 1972 article "OCR's Cost, Capabilities Scare Some Users Away" identified six distinct problems with OCR. From the analysis, optical readers are:

- Prohibitively expensive for most installations.
- Too fast.
- Restricted to reading either documents or pages, but not both.
- Incapable of accepting an assortment of page sizes in a single input run.
- Limited to reading marks, bars, or characters.
- Not standardized between OCR-A, and OCR-B.

Not only are these problems traditional, and passé, they are not even the real problems that confront OCR users and manufacturers today. However, as such misinformation concerning OCR is historically popular, it is worth exploding each in turn.

The belief that OCR was prohibitively expensive for the average user was probably started in 1964 when Recognition Equipment Inc. introduced the first multifont reader at United Airlines. The REI reader was valued at about $20,000 a month or approximately $750,000, and is still operating at United today.

These kinds of costs are relative, and totally irrelevant, in comparison to what is available today, even from REI. Recognition Equipment has always been the Cadillac of the OCR industry, and if a user has enough tricycling keypunches to trade, the cost will justify the ride.

In terms of what is available from four leading OCR manufacturers today (a combination page/document reader with two tape drives, a single font, and a 4K CPU), it doesn't take many key entry devices to justify a monthly OCR cost of $4,400 to $6,400.

For example, a "plain brown paper wrapping" reader valued at $5,400 a month can be justifed in the following circumstances.

Keypunching

Three unbuffered keypunches	$324.00
One verifier	$87.00
Four 3-shift operators	$4,708.00
3K cards/day/keypunch	$63.00
6,300 offset reproduced coding forms each with 10 records or 10 cards	$25.20
Card to tape for 63K cards	$94.50
Total	$5,301.70

Buffered Keypunch

Four buffered keypunches	$840.00
Four 3-shift operators	$4,708.00
Card media cost	$63.00
Coding forms	$25.20
Card to tape cost	$94.50
Total	$5,730.70

Key-to-Disk

Four stations with CPU, disk, tape overheads	$740.00
Four 3-shift operators	$4,708.00
Coding forms	$25.20
Total	$5,473.20

OCR

Reader rent and maintenance	$5,400.00
OCR forms holding 10 records each @ $10/K	$63.00
Part-time operator for 10 hours	$110.00
Total	$5,573.00

If the keypunch costs seem high it is because in a production keypunch department, the cost of standard options will add 30% to off-the-shelf prices. It should be noted that labor represents 85% of key entry costs.

As for being too fast, I don't recall hearing too many complaints when computers evolved from the microsecond to the nanosecond range. As long as a user is not paying a premium for speed, speed is one of the specific benefits of OCR.

Page/Document Dichotomy

The dichotomy between page and document readers applies to only two of the five leading OCR manufacturers. The dichotomy began to crumble in 1964 when Control Data introduced the CDC 915 page and document reader.

As for OCR's inability to accept an assortment of page sizes in a single input run, this sort of versatility is equivalent to expecting a card reader to accept an indiscriminate mix of 51 and 80 column cards without error in a single input stream.

The reading of marks, bars, or characters is a matter of good systems analysis. Bar code reading, like computer input microfilm, is a rather select form of OCR that cannot be compared to the more generalized categories or OMR, OCR and hand print applications.

Considering these last three categories, three of the five leading OCR manufacturers can supply a combination page/document reader capable of reading these three "fonts" from the same document in a single pass.

The problem of OCR-A and OCR-B was erased in 1966 when the Business Equipment Manufacturers Association proposed a set of stylized characters (OCR-A) for OCR which was adopted as a U.S. standard by the American National Standards Institute. Since that time the European and American manufacturers have happily maintained their separate standards.

The real problems of OCR manufacturers and users today are education, proper prior planning, and knowledgeable and effective leadership. Some research into these three areas would produce some valuable historical and current information about the status of OCR today.

David F. Tierney is a systems engineer for hardware evaluation at the State Street Bank and Trust Co., Boston, Mass.

Viewpoint

Some Accountants Are Not Controlling Cash Flow

When accountants enter the field of data processing you would expect them to have very carefully controlled systems – if you judge by the comments we receive from accounting critics of data processing activities. But sometimes the situation is very different, as in one case I have been looking at recently.

In this case the audit trails are incomplete, and assurances are being given to eliminate known problem areas, without any real action being contemplated!

The Taylor Report
By
Alan Taylor, CDP

Really, it appears that this firm's accountants do not control the cash that flows through their accounts, but instead are satisfied to control premium notices – although it is known that this gives less accurate results!

The matter came to light when one accountant, Stephen R. Goldenberg returned the $40.29 premium for his insurance to the National Assocation of Accountants Insurance Trust. Mr. Goldenberg is a busy man, and so, when another bill arrived some time later he paid it again. It was not until two months later, when going over his checks, he found the duplicate payment – and started asking questions.

In answer to his questions the National Association of Accountants Insurance Trusts agents, the Connecticut General Life Insurance Company, explained: "Unfortunately we have no way of knowing when a member remits double premium payments unless he notifies us by way of a letter and encloses photocopies of the checks which he remitted."

According to Connecticut General the problem lies in the computer programs, since the letter said, "The computer is not programmed to pick up duplicate premium payments."

George Fletcher, an accounts administrator of Connecticut General explained how the system worked:

- Payments matching enclosed premium notices were banked in Kansas City.
- Unaccompanied and Odd payments, (for example, people reducing their insurance when they hit higher rates which they do not feel worthwhile) were sent from Kansas City to Hartford, organized by account.
- Checks were paid, by account, into the Connecticut General main office banking account – but the payments were input to the computer without control totals being reconciled, except by physically pulling suspense cards from open account trays.
- Adjustment entries were made to the accounts of the various trusts to balance out the funds where duplicate payments were involved. These are simply balancing adjustments, because they do not refer to a particluar "life" or individual.

The complaint system, he told me, is equally simple. The twice-paid premiums from the member cannot be checked in the DP section; instead the member is asked to prove payment. If he does so, money is refunded, and he is assured that everything possible is being done to prevent such occurrences from reoccurring. The individual is expected to provide his own accounting.

Fletcher says this situation has been around for a long time and that nothing is being done. His argument is that it is a human failure – some girl making up a batch, putting it down while she does something else. Then forgetting where she is in the batch, she just goes on without creating the necessary input.

"There is nothing you can do to stop it," he told me. "Everyone does it – even mortgages. They all ask for the return of the IBM card. That is the way automated systems work – they have to have something returned to feed into the computer."

I don't know what this shows – except that the same over-reliance on experts which occurs in our field is also occurring in the other professions. Certainly there are control systems which can catch duplicate payments. Certainly it is possible to tell the members that you are controlling the premium notices – and not the cash payments.

And it is possible to tell them you have been aware of the problem for some years – but that you are doing nothing about it.

Letter to a Member

From the National Association Of Accountants Insurance Trust

Dear Mr. Goldenberg:

Your letter of September 26, 1972 regarding your double payment of premium for the simiannual period of July 1, 1972 to January 1, 1973 was brought to my attention.

We regret this inconvenience which you have had. Unfortunately we have no way of knowing when a member remits double premium payments unless he notifies us by way of a letter and encloses photocopies of the checks which he remitted.

As you know, premium payments are sent to the Commerce Bank of Kansas City where the checks are deposited and the premium due notices are forwarded to us to be put into a computer. The computer is not programmed to pick up duplicate premium payments. That is the purpose of our enclosing a blurb with each second premium due notice which reads: "Please note: if payment was sent within the last ten days, please disregard this second notice."

Computer's Effect On Business Seen Impacting Structure

WASHINGTON, D.C. – The introduction of a computer system into a company is likely to affect the way people within the organization communicate with each other, according to David W. Conrath of the University of Waterloo, Ontario, Canada.

Since the computer becomes an integral part of a company's interpersonal communications system, the manner in which it is used could well have an effect on the structure of the company. But up to now it has been difficult to measure the impacts and effects of computerization, Conrath said.

Since the effects, he said, "are not necessarily all beneficial, nor are they well known, we argue that one ought to understand the impact that the computer may have on organizational structure, particularly via its use as part of the communications system."

In the past, he said, the introduction of new communications technology and computers has been undertaken with little regard for their impact on the structure of interpersonal relations.

The advances made have often been "engineering marvels," but their development and use have often been fostered by the insights of engineers rather than by studies of the needs of potential users.

When the new technology had little direct interface with the user, he indicated, relations among people in the organization remained essentially the same.

But, he noted, the recent developments in the combination of computers with communications systems are now changing the way in which people relate to one another, especially as computers are more commonly used in the decision-making process of business organizations.

In addition, as the computer becomes more involved in the augmentation device in interpersonal communication such as in Delphi conferencing, "a direct impact on structural relationships will be observable," he predicted.

While these uses of the computer are going to be further developed, he warned, "little consideration is being paid to the effects, both good and bad, that these uses will have on the operating structure of organizations – the networks of interpersonal relations that make up the structures."

The second effect, he said, is less known or studied and involves the change induced among interpersonal relations, "microstructural adaptions."

For example, he said, the introduction of a computer-based information system into a firm with a well defined hierarchical structure generally provides the user with direct access to information that he previously had to ask a particular source for.

"The ability of that source to control the recipient of the information is now greatly diminished, a significant change in the organizational structure," he stated.

Random Notes

Net Installs Generator For Scientific Programs

NORWALK, Conn. – Scientifically-oriented programmers have a program-generating facility appropriate to their needs, with the introduction of the A Scientific Application Programmer (Asap) service on the National CSS remote-computing network.

Developed by Optimal Logic, Inc., New York, Asap is said to write a program to solve any problem that can be expressed as a model involving linear or non-linear algebraic and/or ordinary differential equations. The resulting program may be altered at run-time to execute variations of the original model.

On-line, Remote Services Offered New England Banks

FRAMINGHAM, Mass. – The Framingham Trust Co. and Computer Facilities Inc., Stamford, Conn., can provide small and medium-sized independent banks throughout New England with on-line processing from terminals in the user banks, or remote batch support from local facilities accessible to several banks.

The on-line banking applications are available through arrangement with the developer, Affiliated Computer Services, Dallas, while CRT terminal support is provided through Framingham Trust's Video On-Line Totals System (Volts).

The joint service offering includes use of customer information files (CIF) tailored to each user's needs, a Framingham Trust spokesman said.

Canadian Net Adds Mark IV

TORONTO – Users of the Datacrown Ltd. remote-computing services have access to advanced Mark IV facilities on a remote-batch basis, under terms of a recent agreement between Datacrown and Data Logic of Canada Ltd., Ottawa.

The Informatics software capabilities are also available through the Computel network, based in Ottawa and Montreal, according to a spokesman for Data Logic, Informatics' agent for remote use of Mark IV in Canada.

Recoding Speeds 'Qwick Qwery'

LOS ANGELES – A new version of the Qwick Qwery report generator system provides execution speeds twice as fast as the prior package, according to the developer, Consolidated Analysis Centers Inc.

The improvement was made possible by the redesign of heavily used portions of the system, following measurement studies, a spokesman explained. The generator now runs on Honeywell 6000 and 400 CPUs and on IBM 360/370 equipment. Implementations for CDC and Xerox users are in development, the company said from 12011 QSan Vicente Blvd 90049.

Isam Interface

Current Programs Use Vsam Data Sets

By Don Leavitt
Of the CW Staff

WHITE PLAINS, N.Y. – Users who shift from an older file organization to Virtual Storage Access Method (Vsam) data sets as part of their VS environment on 370 equipment may be justified in considering the transition "transparent" even though they will have to do some work.

Most existing programs that use Indexed Sequential (Isam) logic require little or no modification to process Vsam data sets, according to IBM's OS/VS Vsam Planning Guide (GC 26-3799-0). The data sets themselves will have to be converted to Vsam format, but an Isam interface routine is usually able to interpret Isam commands imbedded in the user program, as if they were Vsam requests.

The only exceptions are said to be those Isam instructions that relate to I/O devices, such as the 2311, that Vsam does not support, and those that define requests in terms of physical device addresses.

Vsam is expected to provide common data set formats for both DOS and OS users, to ease conversion from one VS operating system to the other, the guide said. Access Method Services (AMS), utility system for cataloging and maintaining data sets, includes functions to move the data sets and volumes between environments.

Vsam is said to meet "most of the common needs of both batch and on-line processing." It permits both direct and sequential access, and access can be by key field or relative address reference, the manual said.

Intermixed Processing

Different types of processing can be intermixed when working with a common data set, the guide noted.

Under Vsam, AMS allocates storage space for a data set and catalogs it in either a master or a user catalog. Records can be loaded into a data set by having AMS copy them from a sequential, an indexed sequential or another Vsam data set, or the user can load them with his own processing program, the guide said.

No Overflow

Vsam's method of inserting records into a data set is said to provide accesses whose speed, following a large number of insertions, is "equivalent" to the speed of access without previous insertions. Functionally there is no overflow processing, with the time delays and periodic file reorganization efforts that Isam requires, the guide noted.

Vsam uses a system of control intervals to avoid prime and overflow area processing. Vsam reclaims space taken up by a record being deleted from a key-sequenced data set and combines it with any existing free space to make room for any new records.

Various cataloging techniques are available and the choice can affect performance of Vsam the guide noted.

Run-Time Source Code Patching Eases Development, Maintenance

WALTHAM, Mass. – The Integrated Symbolic Debugger (ISD) software facility, now available on Interactive Data Corp.'s time-sharing network, makes program development and maintenance work much easier, almost without regard for the user's choice of source language, according to the firm.

ISD allows users to dynamically patch Cobol, Fortran or Assembly language source statements into executing programs. The system handles the translation into object code, so the logic can be used immediately.

This not only avoids time-consuming machine recompilations, an Interactive spokesman noted, but saves the programmer the time-consuming effort of converting desired logic changes into machine language or hexidecimal notation before they can be inserted into an object program.

Under ISD, the user is also able to temporarily halt program execution to check the status of the program or to change the contents of one or more variables. After the halt, the user may restart his program at any point he wishes, to test new logic or an old routine that might not be exercised otherwise.

ISD has various capabilities that have been available singly or in small combinations with other debugging systems. These include the interception of programming error conditions, and the taking of corrective action so that test sessions aren't ended prematurely because of a minor problem unrelated to the basic program logic.

Tracing Reports

In addition, ISD allows the user to trace the locations of machine language instructions as they are executed and to trace all branch instructions. Matching these trace reports, printed at his terminal, with a listing of his data files, the user should be able to confirm that the program did what was expected, or identify quickly where it went wrong.

ISD is a single system of routines that supports users' work in ANS Cobol or Cobol F; Fortran IV, G Level; or IBM's Assembler F or H. The system, implemented on Interactive's 360/67s, produces debugged programs that are compatible with OS or DOS/360 environments, the Interactive spokesman added.

Users of ISD pay only a time charge, which the company estimates as averaging $35/hr.

'Quartermaster' Library System Manages OS Tape, Disk Volumes

CHICAGO – Operations managers in OS/360 installations can get better control and more effective utilization of their data-set libraries, at relatively modest cost, with the Quartermaster librarian system from Phoenix-Hecht Inc.

Less expensive than some other packages with similar capabilities, the $7,500 package does its work without requiring any modification of OS coding.

Wide Support

Quartermaster supports disk, drum, tape and data-cell volumes, and is open-ended for addition of new, conceptually similar volume types.

The system obtains much of the information concerning a VTOC volume by direct examination of the table of contents. It utilizes the OS System Management Facility (SMF) to capture the data-set name, volume serial number and retention period of each new data set cataloged to a non-VTOC volume.

OS Not All Inclusive

OS is not all inclusive, however, and the librarian includes a support for operator-entered transactions to correct errors, to reflect usual conditions or to alter Quartermaster accounting log.

The package is normally run as a daily batch job, at which time the volume catalog is updated, and expired and deleted data sets are uncataloged. Various tape-reel stickers may be generated for the librarian, and reports produced for the users and management as well as the librarian.

In addition, the system makes a check, based on frequency limit carried in the volume catalog, to determine whether maintenance processing is due on any VTOC data sets. If so, a warning is issued.

Phoenix-Hecht is at 111 East Wacker Drive, 60601.

BASF/ENDURA PRESENTS FAMOUS ENDURANCE RECORDS: THE GREAT BALL PUNCH.

On New Year's Eve back in 1955, Ron Reunalf of Australia matched his own endurance record for punching a ball. 125 hours 20 minutes! A tough act to follow.

But at BASF, we're interested in setting more practical kinds of endurance records. Which is why we developed the new computer tape we call BASF / Endura.

A tape made so well it will meet not only today's transport requirements, but future 3200 BPI/6400 FCI expectations as well.

The secret is Endura's unique thinner coating. It makes the tape more flexible, less abrasive and a lot more durable. Because it's harder than conventional coatings. That means you'll still be getting accurate, reliable service 5 and even 10 years from now. Or we'll give you a new tape free. Yet the price you pay for BASF / Endura is a good deal less than what you probably pay for computer tape now. Performance-testing and more efficient manufacturing methods have resulted in savings for us and you.

BASF / Endura. Why not give it a shot?

For the details see your BASF representative.

BASF SYSTEMS
Division of BASF Wyandotte Corporation
Crosby Dr., Bedford, Mass. 01730

COMMUNICATIONS

Data Briefs

Cassette System Interfaces Terminals, Data Equipment

SAN DIEGO, Calif. – A cassette tape system from Cipher Data Products provides RS-232 bit serial interface between terminals and data communications equipment operating in synchronous mode.

Designated the Mini-cette 2200, the cassette drive system includes a controller and one bi-directional, dual differential capstan cassette transport with a speed of 6 in./sec.

The system's packing density is 800 bit/in. with an 8-bit character, and it has a read/write speed of 600 char./sec.

Commands include: read-a-record forward, write-a-record forward and space-a-record reverse.

Priced at $2,450, the Mini-cette will produce a cassette, when properly programmed, that meets the recently adopted Ansi/Ecma standards. Delivery is 60 days.

Options for the Mini-cette include couplers for the Data General Nova and Super Nova, and I/O drivers.

The firm is at 7655 Convoy Court, 92111.

Controller Enhances Mini

FORT LAUDERDALE, Fla. – An asynchronous interface controller has been introduced by Datacraft Corp. for its DC 6024/5 CPU.

Comprised of two distinct receiver and transmitter sections, the Model 9020 controller converts asynchronous 5-, 6-, 7-, or 8-level serial codes to parallel data and vice versa.

The controller will handle data speeds from 112.5 to 9,600 bit/sec, and is capable of half or full duplex transmission. It is compatible with ASR-33, KSR-33, ASR-35 and KSR-35 TTYs; Bell 202, 103F, or equivalent modems; and all dedicated terminals (CRT, printer, etc.) that appear as an EIA standard RS-232B, the firm said.

The Model 9020 is priced at $800, with first deliveries in December. The firm's address is Box 23550, 33307.

Data 100 Has Terminal

MINNEAPOLIS, Minn. – The Data 100 Model 88-22 keyboard terminal offers IBM 2780 compatible transmission capabilities at speeds of 2,000 or 2,400 bit/sec. The system includes a 165 char./sec printer, stored program control unit, Comfile storage drive unit, keypunch/batch terminal simulator and IBM Selectric typewriter input unit with alphanumeric keyboard. An auxiliary 10-key numeric keyboard is also available.

Basic lease price of the Data 100 Model 88-22 is $595/mo. First deliveries are scheduled for the fourth quarter of 1972.

Analysis of New Method

MDS Transmissions Could Help Users

By Ronald A. Frank
Of the CW Staff

CAMBRIDGE, Mass. – A new common carrier transmission method, recently authorized by the FCC, could solve some local loop problems now facing data communications users and the specialized common carriers.

Although new in a regulatory sense, the technical principals used with omnidirectional microwave transmissions are well within the state of the art. The method is called microwave umbrella, datacasting, or Multipoint Distribution Service (MDS) by the FCC.

In a typical MDS system, a central transmission point is used to send signals to specially-equipped reception points within a 20 to 25 mile radius. The signals can be received by dish antennas and electronics equipment "decodes" the transmissions.

MDS can be used to transmit video, voice, and data signals. While the first applications will probably be closed-circuit TV, the potential uses of MDS for data are attracting the interests of specialized carriers. With new carriers beginning to build long-distance facilities, short distance local loops are a continuing requirement.

MCI, for example, has relied on local telephone companies to supply wire pairs from its long distance terminals to the customers locations.

But there is a limited amount of wire available for such purposes and "stringing new copper" is expensive, even for the phone companies. The use of two-way cable TV systems has been proposed within cities but this also depends on laying cable to subscriber's sites.

The obvious advantage of an MDS system is that signals travel through the air to the user's location. And except for the wire from the roof to the user's communications installation, there are no expensive facility problems to worry about.

But an MDS system does have some serious drawbacks. The most serious for the data user is that it is basically a one-way, not a two-way distribution medium.

The proponents of MDS think data users such as subscribers to time-sharing services could make good use of a one-way system. They argue that many data transmissions are of an inquiry retrieval nature with short requests to the computer and large amounts of data transmitted out from the CPU to the user. They foresee a user sending his inquiries via a conventional phone line and receiving his output via a relatively inexpensive MDS system.

One firm has already filed applications to provide MDS service in 33 cities. Called Microband Corp. of America, the firm foresees an interconnected nationwide system of cities linking the major urban areas across the country.

Responding to critics who question the security of data transmitted through an MDS system, Microband President Mark Foster said the service will be "sequentially time shared" so users can be assured their particular transmitted information is received "only at the locations they wish to reach."

Speaking on MDS principles to a recent meeting of the New England Telecommunications Association, Foster described the method as a "one-to-many, non-switched service."

One vendor ready to supply an MDS system is the Micro-link division of Varian Associates. The Varian system is designed for video transmission but few changes would be required to alter the system for the transmission of data, according to a company spokesman.

As presently authorized by the FCC, MDS systems would operate in the 2,150 to 2,160 MHz band. Two channels will be available, with bandwidths of 4 and 6 MHz.

Both channels will be able to transmit data as well as video and facsimile. While not yet part of the present system, an "over-the-air talk-back service" allowing full two-way operation is a distinct possibility, according to Varian.

Most observers agree that MDS is still in its infancy. But as the first systems become operational, when approved by the FCC, data users could get their much-needed local loops through a previously unexpected method.

TI Adds Cassette Storage Unit To Its Silent Terminal Series

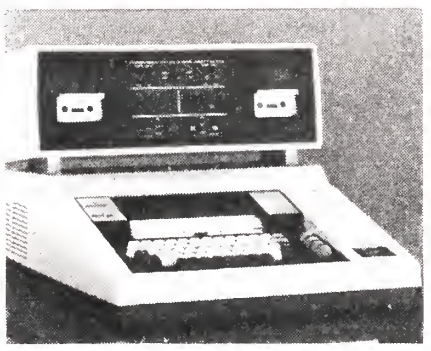
HOUSTON, Tex. – Texas Instruments (TI) has added an ASR twin-cassette unit to the Silent 700 terminal line. In addition, the firm reduced prices up to 25% on earlier models in the 700 series.

The ASR Model 733 operates at 10, 15, 30 and 120 char./sec and has a simultaneous transmit and receive capability. The device can also handle on-line data transmission concurrently with off-line data preparation through cassettes. Off-line editing by block or character can be handled by the terminal with switch selectable odd, even, or mark parity generation.

Phillips-type digital grade cassettes are used with a capacity of 800 bit/in. for a total storage of 310,000 characters per two-track cassette, the firm said.

A KSR version operates at 300 char./sec including the non-impact printer used with earlier models in the 700 series. Full Ascii upper and lower case keyboards are available and two models offer CCITT Baudot code. The terminals can be used in both dial-up and private data links.

The twin-cassette Model 733 ASR terminal costs $2,750 and leases for $120/mo. The Model 733 KSR costs $1,500 and leases for $75/mo. Price reductions on other models include a cost of $2,250 for the Model 720, down from $3,000; and a price of $2,780 for the Model 725 portable unit, down from $3,300.



TI Cassette Terminal

First deliveries are scheduled for January. The TI digital systems division address is Box 1444, 77001.

Novation Introduces 1,200/1,800 MOS/LSI 202-Type Data Set

TARZANA, Calif. - Novation Inc. has introduced its Model 202 1,200 or 1,800 bit/sec, FSK modem with MOS/LSI technology. Called the Model 202 and designed to replace Bell 202 C/D/E data sets, the LSI chip allows all Bell options and many customer-specified features to be placed on a single circuit board.

The modem's reverse channel option provides either 5 bit/sec supervisory or 150 bit/sec channels while receiving data from a CPU at 1,200 bit/sec over 3002 Bell unconditional lines.

Price is $366 and delivery is 30 days from 18664 Oxnard St., 91356.

T-Scan Adds Indexing

TORONTO, Ontario - T-Scan Ltd. has added a line index notation feature to its Model 100 mark sense transaction terminal.

By means of a pencil mark the user can select alternate items, request expansion of selected data fields, or correct field data, the company said. The Model 100 provides a printout of transaction verifications and responses. The terminal costs $9,700 from 34 Continental Place.

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COMPUTERWORLD
THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

Our 18/30 DMS was designed to appeal to 40% of all IBM 1130 users.

Our new 'Mini' DMS should get the other 60%.

When we introduced our 18/30 Disk Monitor System, we stressed that it was designed as a direct replacement for the IBM 1130, with *significantly* more throughput for about the same cost.

We also took the liberty of mentioning that our 18/30 DMS runs all your present 1130 software and that all programs written under DM2 operate directly on the 18/30 DMS. Finally, we noted the availability of a complete library of our own field-proven software as well as a whole line of faster peripherals like mag tapes, big disks, card readers and line printers.

For 40% of you (namely, those of you who've already reached the throughput limit of your 1130), the 18/30 DMS is great news.

In fact, we've sold nearly 100 systems to date!

The other 60%.

But what about all the rest of you who don't need all that extra throughput or all the added peripherals?

For you, we've got the new 'Mini' DMS.

Also a direct replacement for the IBM 1130.

Yet significantly less expensive to use. *(Up to 40% less expensive per month!)*

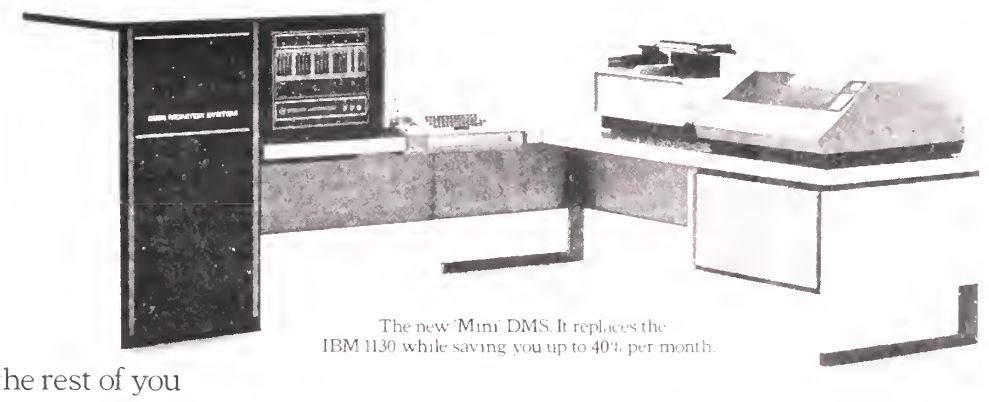
But that's not all. Because it makes use of our powerful 18/30 computer, the new 'Mini' DMS will still give you at least as much throughput as your 1130 and in some cases (in disk-type applications) much, much more. And, with the new 'Mini' DMS you can still run all your existing 1130 programs *and* you can still choose from a complete library of our own field-proven software.

How can we get you?

It should be obvious by now that, if you're operating an IBM 1130 system, we want your business.

And now, we've got you covered from both ends.

With our super-throughput 18/30 DMS.



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Or our new money-saving 'Mini' DMS.

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To arrange for a demonstration, please call (714) 778-4800. Or write General Automation, 1055 S. East St., Anaheim, California

(Incidentally, if you're planning to attend the Fall Joint Computer Conference, make a point to stop by Booth 4525. Bring us a benchmark and we'll prove we mean business.)

General Automation

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Bits & Pieces

Replacement Unit Offered To 3330 Users by Ampex

MARINA DEL REY, Calif. – Ampex is offering a replacement disk drive for the IBM 3330 sale priced at $25,000 or $465/mo for a two year lease compared to a 3330's cost of $30,550 or $546/mo for a two year lease.

The Ampex DM-330 offers average access time of 28 msec compared to 30 msec for the IBM 3330.

Up to 16 Ampex drives, storing 100M bytes of data each, can be linked with controllers on IBM 370 computers without hardware or software modifications, according to the firm.

The new drive is 38 in. high by 19.25 in. wide by 34 in. deep and weighs 550 lbs.

MT/ST Cartridges Converted to Tape

BLADENSBURG, Md. – The Dig-Data 30 converts IBM MT/ST cartridges to computer compatible tape at a rate of less than four minutes per cartridge, according to the firm.

Optional code conversions permit the creation of code such as EBCDIC or ASCII.

The unit is of particular interest to graphic arts users and of general interest to users who wish to process MT/ST information on a computer, according to a spokesman.

Basic system cost is $7,500 or $278/mo. from 4315 Baltimore Ave., 20710.

Rough Sketches Welcome Here

BURLINGTON, Mass. – Applicon Inc. has announced a computer graphics processing system that accepts rough sketches, allows the user to make changes interactively, and produces finished drawings.

Input to the Applicon 701 System can be from datastylus or from computer peripherals. The user is able to add, delete, move, flip, rotate, stretch, step, repeat, and copy graphic information as the drawing is being produced.

Typical cost for the system is between $75,000 and $90,000 from 22 Third Ave., 01803.

Selectric Suited for PDP-8 Users

POMPTON LAKES, N.J. – An IBM Selectric typewriter and an omnibus interface form the basis of $2,095 I/O device for PDP-8 users.

The model CSR-8E, from Terminal Equipment Corp., operates at 15 char./sec, using standard DEC TTY software – all 128 Ascii characters can be generated from the typewriter keyboard.

The new terminal offers users the advantage of upper and lower case characters and changeable type fonts.

The firm is at 750 Hamburg Tnpk., 07442.

Power Fluctuations Can Cause Users More EDP Problems Than Brownouts

By Michael Weinstein
Of the CW Staff

Recent increases in electric power demand and the ensuing brownouts have caused major concern for better power generation; but little has been said of improving the general transmission of power over lines to avoid transient fluctuations which can be far more insidious and damaging than any arbitrary dropping of voltage levels by a utility company.

Most users ignore line fluctuations because they are considered acts of nature and not all that serious or common. Line fluctuations are far more common, however, than most users realize. A tabulation of power failures at a number of large computer facilities showed 50 to 100 failures per year large enough to create problems that were not attributable to a planned utility company slowdown.

The frequency and cause of the disturbances vary with locality and line construction. High winds, ice build-up on wires, fire, insulator flashover or breakdown, and motorists hitting power lines are beyond the control of either the computer facility or the utility.

The insidious nature of fluctuation problems is that they only last a fraction of a second. In most cases the system does not crash but the damage is done. Problems are not discovered until later and then are blamed on bugs or phantoms of the computer.

As an example, rotating memory devices which are frequency sensitive will change sector size on "write." If frequency goes down the sector size gets smaller; if the utility company later compensates for the loss with more power the sector size increases.

Power fluctuations to the mainframe can cause data being moved to be altered or lost without the knowledge of the operator or programmer.

Motors subjected to voltage changes for long periods of time suffer increased stress and burn out. This is especially critical for computer equipment that is already heat sensitive and in many cases needs air conditioning.

With pre-announced brownouts, a manager has some choice in his actions; with line problems he may not even know he had a problem.

Although equipment exists that can help in this area, it is too expensive for the small and medium sized user. Turning to the utility company or to the computer maker for help is generally futile, as noted in the recent case of a Michigan company.

Guardian Industries is located outside of Detroit and runs an installation of an IBM 360/30 with 128K interfaced with a System/7, remote 2780s, 2770s and CRT terminals.

Ninety-nine percent of the failures at Guardian are caused by transient failures of 1/2 to 1 sec, according to Jose Santiago, DP Manager.

Most of these problems are caused by exposed power lines that are subject to wind and rain. During wet periods line problems serious enough to crash the system occur about once a week.

During this summer the Guardian system was affected by one two-week period when brownouts occurred. These brownouts dropped voltage from 208 V to 180 V in the most drastic case.

After months of trying to trace the cause of what appeared to be mysterious bugs in the system performance, the om pany bought a line monitor to check whether their problems might not be due to either hardware or software but to power fluctuations.

The line monitor was set up to show when the power rises or falls out of an acceptable level for computer operations.

A record of these fluctuations showed that "each month power drops or exceeds an acceptable limit by 7,000 peaks above and 300 to 400 drops below," Santiago stated.

Types of problems these fluctuations caused were the crashing of peripherals. Disks and tape units were the most sensitive. Guardian experienced no head crashes but had numerous cases of data being scrambled, master files destroyed, and circuit cards burned out.

Each time this happened data had to be reconstructed from scratch. This meant Guardian had to keep extensive backup of all material that possibly could be lost and it had to create backup tapes more frequently.

In looking for a solution to these pulse problems, Santiago first attacked the summer brownouts by buying a transformer and purchasing high-voltage power from the utility company.

If Detroit Edison decides to drop the voltage there is still enough high-voltage power so that Guardian can use the transformer to provide the needed power. But Santiago laments that the cost was far too high for something that was effectively needed for only two weeks a year.

The transient line problems are causing Guardian to look into buying a battery or flywheel system that can carry the system over the 1/2 to 1 sec fluctuations. "Such a system [flywheel] can cost as much as $50,000 for full power supply and is only slightly less generous than batteries to hold them over the drops," according to Santiago.

Santiago tried to complain to the utility, but it said that because the computer facility was located in an outlying region, no help could be expected for two to four years.

"Complaining to the utility is no good for it tells you it is the only one in town."

"I guess, for the user too small to afford expensive equipment there is no answer . . . for us we are sort of married to the utility company; but it is a shotgun marriage," concluded Jose Santiago.

New Security System Compares Badge Against Person's TV Image

MOUNTAIN VIEW, Calif. – A security system that uses a display screen and remote television camera allows users to control access to their computer rooms by comparing – side by side – the televised picture of a person wishing access and a pre-issued badge with his photo.

The new Videoguard 100/200A from Mardix Security Systems includes a single or dual monitor control console, an identification console, a surveillance camera, an electronic door strike, and a door status alarm.

An intercom between the entrance and the control console is provided so security personnel can query unknown or suspected persons.

When not in use for direct personnel identification the system can be used for area surveillance, according to the firm.

Installation takes less than a day, and no building modifications are needed, according to a spokesman.

Mardix unit provides remote central control of entrances.

Complete systems are priced from $2,300 to $3,700 from 900 Stierlin Rd., 94040.

THE MULTI-TASK COMPUTER THAT MAKES ITSELF EFFICIENT.

A lot of people have suddenly become very interested in multi-task computers.

And suddenly they've become worried about efficiency. In computers and in the people who use them.

Few have noticed how closely the two are related. How inefficient most multi-task computers are.

And even fewer have understood why.

MULTI-TASKS CAN MAKE A COMPUTER INEFFICIENT

Most computers started out with batch processing, then grafted on multi-tasks and multi-terminals.

It was, however, more easily said than done. While working in batch, lots of different people had developed lots of different software, with lots of different wrinkles. To get everything working together on a multi-task system, they had to add all sorts of connecting links to the software. And that's where the whole problem started.

Just running the computer — keeping all the users straight, giving everyone what they needed, processing all their jobs — began to take up more CPU time than the work itself. The computer inevitably became inefficient.

Our DECsystem-10 stands out as an exception to the rule. In a typical installation, it spends 90% of its time on useful work.

One of the reasons for that is our approach. We didn't start off with a huge backlog of batch software.

DECsystem-10 started out as an on-line, interactive, multi-task computer that lots of different people could all use at the same time. For timesharing, real time, batch or remote batch. By simply going to any I/O device and doing it. Without ever having to worry about what everybody else was doing at the same time.

But the biggest reason why DECsystem-10 is so much more efficient is the way it was designed. Starting simply and evolving steadily over eight years.

THE WAY TO MAKE A MULTI-TASK COMPUTER EFFICIENT IS TO KEEP ALL OF ITS RESOURCES WORKING ON USER'S JOBS AS MUCH OF THE TIME AS POSSIBLE

Most computers were (and still are) designed on the theory that the best way to share computer resources is to preallocate fixed chunks of the resources to each user. To define specific partitions for each user and each resource throughout the computer.

The theory may look good, but in practice it leaves a lot to be desired. People don't always act the way they are supposed to. They use less computer than they've been given. Or they need more. As a result, much of the time the CPU just sits there waiting.

DYNAMIC RESOURCE ALLOCATION DOES IT

Rather than try to preallocate the DECsystem-10 resources, we assigned the job to the internal operating system. So there would be no fixed partitions.

We made the operating system sense the demands being put on the computer then automatically allocate resources to handle those demands in the most efficient way. And we made it a dynamic process. So if a user needs more computer, he has it. And as soon as he doesn't need it any more, the operating system assigns it to someone else. And this dynamic process happens for every single resource in the computer. The CPUs, main memory, virtual memory, file system, I/O devices, software. Everything.

Because of dynamic resource allocation, DECsystem-10 can keep as few as 5 out of the active jobs in main memory. The rest go into virtual memory storage. But nobody ever knows. Virtual memory makes up to 127 jobs run just as though they were in main memory.

But a computer is only as efficient as the software. So we made DECsystem-10 software share-able.

SHARED SOFTWARE SAVES MAIN MEMORY

That means that several users can all share the same language compiler like COBOL, BASIC, FORTRAN, and MACRO, at the same time. Since they don't need their own individual compiler copies in main memory, more space is available for the work you really want done.

AN EFFICIENT COMPUTER LETS PEOPLE USE IT EFFICIENTLY

It's a lot easier to get a program up and running on a DECsystem-10.

You can go on-line to prepare, edit and debug COBOL, FORTRAN, and MACRO jobs. No tedious batch runs. No memory dumps.

And you don't have to worry about the geometry, size or location. You just give a file name. The computer does the rest.

You don't have to worry about the security either.

Your files are automatically protected.

At the same time, you also have a complete set of options that let you share whatever files you want with anyone you want.

We also gave DECsystem-10 a multi-level monitor that lets real time users get their jobs done as efficiently as possible. Anytime they need response in micro-seconds, they can lock their job in core. So anytime an interrupt occurs, it is processed immediately.

Indeed, the multi-job turn-around time on a DECsystem-10 often turns out to be faster than the turnaround time on many equivalent single job systems.

THE RIGHT SOFTWARE SAVES USER TIME

Since so many different kinds of users need so many different kinds of software, DECsystem-10 has all the languages users need to do their programming as efficiently as possible: COBOL, FORTRAN, BASIC, ALGOL, APL, WAITS, SNOBOL, LISP, MID, BLISS, DATA MANAGEMENT, SPSS, CSSL, JOVIAL, MIMIC.

IT SHOULD WORK THE WAY YOU WORK

And since so many different people want to use the computer so differently, we made DECsystem-10 transparent.

Anyone can walk up to any terminal and do whatever he wants to do, without worrying about what everybody else is doing. On the other hand, the computer scientist who wants hands-on interaction every inch of the way can do that, too. The DECsystem-10 hardware and software is easy to get to, easy to understand, and easy to modify.

What's more, they can work in whatever mode they prefer – batch, remote batch or timesharing – without having to learn many different command languages. DECsystem-10 uses a single, common set of job commands for all modes, all languages.

AN EFFICIENT COMPUTER LETS NETWORKS WORK EFFICIENTLY

Because it's so easy to work with DECsystem-10 often ends up in networks. It's equally at home as a number-crunching host to minicomputers or as a communications and timesharing front-end to other computers like the 6600, 7600, 360/91, ILLIAC-IV. Networks have supported Digital and we've supported them. With off-the-shelf simulators and interfaces that'll let you hook Digital PDP-8s, PDP-11s or other computers into a DECsystem-10.

Indeed, DECsystem-10 is a superb computer for developing software for the PDP-8 and PDP-11. We're using it ourselves on most of our minicomputer system software.

DECsystem-10 MAKES DIGITAL EFFICIENT

For that matter, we're using DECsystem-10 throughout our organization. For payroll. Manufacturing scheduling and control. Accounting. Finance. Inventory. Order processing. And of course engineering design and development.

DECsystem-10 MAKES EFFICIENT USE OF YOUR MONEY

Digital has always made more computer cost less. DECsystem-10 happens to be the biggest example of all.

Because DECsystem-10 is so efficient, you can get more work out of less computer. So you can buy less computer. Which is why you can probably get a DECsystem-10 to do your job for half the cost of other computers.

A basic DECsystem-10 complete with CPU, 64K of 36 bit word main memory, 30 million character disk system, magtape system, card reader, line printer, real time clock and 16 data communication ports can be leased from us for $8K per month. Or purchased outright for $387K.

Yet even this small DECsystem-10 gives you all the features of the biggest system. When you need more performance, you add more hardware. Nothing gets thrown out. No software has to be changed. And you can expand the DECsystem-10 as much or as little as you need. There are no fixed boundaries at any level.

In fact, the smallest DECsystem-10 can grow into a dual processor, 4 million word main memory, 2 billion character disk, 16 magtape drive, 2 line printer, 2 card reader, 192 interactive terminal, 8 remote batch station, 64 real time device multi-million dollar system, that can run up to 127 jobs simultaneously.

DECsystem-10 IS MAKING A LOT OF PEOPLE MORE EFFICIENT

At research laboratories like MIT, NASA, University of Illinois, Canada's Department of Energy, Mines and Resources, and Germany's University of Bonn, DECsystem-10 is monitoring particle accelerators, controlling mass spectrometers, analyzing bubble and spark chamber data, cataloging environmental data, acting as host computer in huge networks, and analyzing data from satellites.

In college and university computer centers like Cal Tech, Wesleyan University of Pittsburgh, Catholic University and Australia's James Cook University, DECsystem-10's handling everything from budgeting and class scheduling to business data processing and student instruction.

In businesses like First National City Bank, Johnson and Johnson, British European Airways, and The Coplex Press, DECsystem-10 is doing in-house time sharing, on-line COBOL programming, accounting, and typesetting.

For companies like IRW, Rolls Royce, Canada's Interprovincial Pipeline, Pfizer, and Plessey Telecommunications Ltd., DECsystem-10 handles on-line data collection, data management and control, on-line quality control, simulation, and scheduling.

And for data service organizations like On-Line Systems, TYMshare, Rapidata, Time Sharing Ltd., Datalmo Systems Ltd., and Cyphernetics, DECsystem-10 is involved in all kinds of industrial, scientific and commercial applications.

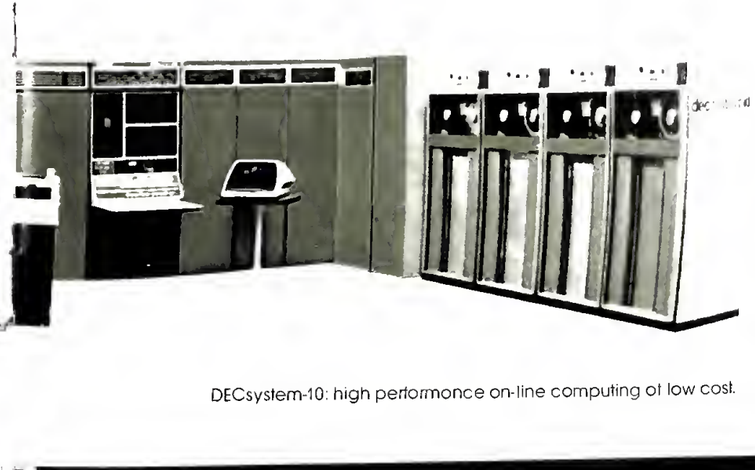
If you'd like to see one of our 240 installations at work, we'll set up a visit.

Or if you want to come to Maynard for a demonstration of everything mentioned here, that's fine, too.

Or if you want to get deeper into the technical side of DECsystem-10, write for the DECsystem-10 Technical Summary.

Or if you want to enjoy reading about who's doing what with the DECsystem-10, ask for the applications literature.

In any case, don't hesitate to call. We'll put you in touch with one of our people who can help you with whatever you're trying to do.



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digital

Many Tapes Cost More to Run Than They Are Worth

WALTHAM, Mass. – Long before a tape reaches the end of its physical life it will reach the end of its economic life.

The economic demise of a tape occurs when the tape acquires so many permanent errors that the value of computer time wasted equals the cost of buying a new tape.

The following formula to determine the break-even point was provided by Monty Morris while at Kybe Corp.

(no. of permanent errors) x (cost per error) x (no. of passes/yr.) = (cost of new tape)

Using the formula an arbitrary cost of $15 is used as the cost of a new tape.

Determining the number of passes per year may be difficult for a given reel, but an approximation can be made by dividing the number of passes annually by the number of reels in your library.

If a significant number of tapes are not used often then these tapes should be omitted from the average.

The cost per error is the computer time lost when a drive fails to read a bit and backspaces and tries to re-read the bit.

Most software specifies 10 retries for unreadable information before the drive skips beyond the error.

For the purpose of Kybe's formula, errors which can be read after a few retries are not considered. Only errors that require the skipping to a new area are used.

Write skips are caused by the build up of oxide wear particles generated by continual passage of the tape over the drive head.

As oxide develops it lifts the tape away from the head thus diminishing the signal. When the oxide is thick enough – (.0025 in. at 1600 bit/in.) – the signal level drops below the acceptance level and a permanent error occurs.

While a write-skip takes only a fraction of a second and does not lose information or interfere with program operation, it does cost a tangible amount of computer time.

Computer cost ranges from two to five cents depending on the system. Using the more conservative figure of two cents per error and for purpose of illustration assuming 50 passes per year per tape, Kybe's formula states:

(no. of errors) x ($.02) x (50) = $15.00 or, a tape with 15 permanent errors wastes as much computer time over 50 passes as the cost of a new tape.

The formula ignores several realities such as: error counts increase gradually and do not immediately jump to 15. But a true formula would require calculus and is unnecessary for an essentially simple problem, according to Morris.

Controlling Tape Cost

To get the best from tapes users must be able to determine the error level and when a tape has an excessive error level, they must be able to repair or replace the tape.

Many users are familiar with only two methods of improving tape performance: cleaning and certifying.

In-house tape cleaning allows the librarian to cycle tapes through inexpensive and easy-to-use tape cleaners, some of which can remove up to 98% of the errors present on the tape, according to Morris.

The drawback of this approach is a tape containing a high number of non-correctable errors can be cleaned and return to service.

Tape certification – the ultimate in rehabilitation – is usually performed by a service company. Certification is accomplished by placing all "ones" on a tape and trying to read them. Failure to read any bit causes the tape to stop at that point where an operator attempts to clean the tape, generally with a scalpel. A count of errors is kept so that when a tape reaches an absolute end of economic life it can be replaced.

The drawback is that certification is expensive and has a fairly slow throughput. Current costs for certification are around $7 to $8 on a service basis, according to Morris.

A more recent development is tape testers which perform the same read-write certification as the service companies but do not stop the tape. Errors are indicated on counters and charts.

Testers take more skill to operate than cleaners yet they not only clean tape but indicate the condition of the tape.

Using a tester, tapes with fewer than 15 errors for 50 annual passes could be put right back into service. Tapes with a few more errors – e.g., 15 to 25 could be sent for recertification; tapes with more than 25 errors could be discarded, according to Morris.

If most errors are concentrated in a few hundred feet, this section can be clipped off and a new Bottom of Tape marker applied.

Certification can be accomplished on a computer with a tester but this is generally too expensive. Obviously a program that costs $5 to run becomes as valuable as a new tape after the third running.

More common are programs that print errors uncountered during a write run, and from this future action is directed.

Both cleaning and cleaning-testing programs should be operated on a rotating basis of tape usage – not tape age.

Leading authorities recommend cleaning every 10 passes at 800 bit/in. and every five passes at 1600 bit/in.

Another factor to consider is when converting to 1600 bit/in., the higher density systems have more programming safeguards but are four times as susceptible to dropouts due to oxide build-up.

By extending the Kybe formula to – (errors/tape) x ($.02/error) x (tapes run/day) x (work days/yr) = cost – users can form a partial determination of what tape errors cost per year and what sort of preventive service or equipment is justified.

New B6700s Include Software To Reconfigure Around Failures

By Edward J. Bride
Of the CW Staff

DETROIT – Burroughs has introduced four new members into the B6700 family which can detect component failures and re-wire themselves through software – reconfigure themselves – to get around the faulty components.

The new capability is embodied in the Dynamic Reconfiguration System (DRS), which enables programs running at the time of a failure to automatically restart following reconfiguration, Burroughs claimed.

"Appropriate recovery procedures" incorporated into program design could render system failures "virtually transparent to the user," the company said.

Nine other models of the B6700 family were also introduced, and most of them have Burroughs' Controlled Reconfiguration System (CRS), which performs essentially the same duties, but most be initiated by an operator.

Existing B6700s can also be outfitted with CRS. Both the controlled and dynamic modes come under the Burroughs category of "failsoft," sometimes referred to as "graceful degradation," a company official noted.

The four new models with DRS are the B6725FS, B6728FS, B6735FS, and B6738FS.

The nine CRS models are further categorized as commercial/scientific or strictly scientific.

The main development in the systems is the DRS, which is especially important to communications users. DRS "maximizes system availability for online data communication environments which may be unattended," Burroughs said.

The company claimed DRS is an "industry exclusive" which will "reconfigure the system to a workable configuration, reinitialize the operating system, and allow the restart of user programs in a matter of seconds."

A large B6700 user, who is considering modifying his system with CRS, said the chief advantage is the ability to "stay up" during component failure, and during maintenance and testing of various system elements.

Dual processors are needed for automatic reconfiguration, the user observed, and it is therefore unlikely that the capability will be extended to smaller systems. Burroughs said it was studying this possibility.

The new models, or a field upgrade to CRS, will cost around 10% to 25% more than old systems, according to Burroughs.

New Model Prices

At the lower end of the automatic failsoft (DRS) models is the 6725FS, which sells for just under $3 million, and leases for $60,000/mo (plus maintenance of about $4,000/mo). Included are two central processors, two I/O processors with six data switching channels each, two console desks and controls, four 65K "failsoft" memories, two disk memory subsystems with a total capacity of 10M bytes, plus the other failsoft gear that includes memory configuration adapters and the reconfiguration control unit.

The 6728FS, priced slightly higher, includes the same hardware plus two additional data switching channels.

The three-processor 6735FS includes most of the same equipment, with six data switching channels for each of the two I/O processors. It sells for under $3.3 million, and leases for $68,000/mo. Maintenance is an additional $4,151/mo.

The 6738FS has the same equipment, with two additional data switching channels, and sells for $3.35 million, and leases for just under $70,000/mo plus $4,405/mo for maintenance.

At the low end of the operator-initiated failsoft systems, the CRS models, is the 6713, which is priced just under the IBM 370/145, according to Burroughs. Basic configuration includes one processor with 98K bytes of core memory, 1.2 μsec cycle time, 10M bytes of disk memory, I/O processor with four data switching channels, plus an operator console with dual displays.

The 6715 is priced about 20% higher than the 145, and almost 10% higher than the Honeywell 6044 when twinned. (The 6713 can also include two central systems and leases for about the same as the 6044). The 6715 includes 196K bytes and six data switching channels.

The upper level of the new models includes three central processors, two I/O processors and 16 data switching channels.

Burroughs discontinued seven models in the 6700 family, the 6711, -12, -14, -21, -22, -24 and -34.

Bi-Directional Punch Offered

SANTA ANA, Calif. – A new punched tape reader – Model RR-6300 – features asynchronous reading speeds to 300 char./sec and bi-directional operation.

In single units the RR-6300 costs $695. A fan-fold tape handling assembly is a separate accessory at $100 extra. Volume discounts are available from 1733 Alton St., 92705.

Random Access Tape System for HP 2100

BELTSVILLE, Md. – A tape-based direct access memory system is available for HP 2100 users from Computer Operations Inc.

The Linc Tape system features phase recording on mylar "sandwich" tape at 400 bit/sec packing density and a unique reel-to-reel tape path to provide a reliability of 500,000 error-free read/write passes over the same tape, according to the firm.

Permanently recorded clock marks and block addresses permit disk-like random access.

The master drive provides 102K 16-bit words expandable in 102K word increments to 1.6M words on-line.

Units include I/O and power cables, internal power supply, and supporting software.

Master drive with 102K words costs $3,950. Each additional 102K slave drive is $1,700, and pre-marked word tapes sell for $12.50 each. The firm is located at 10774 Tucker St., 20705.

Societies, User Groups

Afips to 'React' During FJCC Program

By a CW Staff Writer

MONTVALE, N.J. – "The computer center as a library" provides the unofficial theme for an all-day seminar to be held in conjunction with the Fall Joint Computer Conference next month.

The "impact of the computer on libraries and information systems" will actually be the focus of this "vertical adjunct" program, being planned by the Special Libraries Association (SLA).

The full-day program, which goes from 8:30 a.m. until 6:30 p.m. on Tuesday, Dec. 5, will feature ten papers, each followed by open discussion with attendees.

A "reactor panel" comprised of representatives of the various DP societies will help stimulate these discussions, according to officials of SLA.

The SLA is one of the 13 constituent societies in the American Federation of Information Processing Societies (Afips), sponsor of the joint computer conferences. All members of the reactor panel will represent one of the Afips groups, SLA reported.

Chairman of the adjunct program for Information Data Centers is Joe Ann Clifton, manager of technical libraries at Litton Industries.

The seminar gets under way with an overview of the history of computers as they have related to libraries and information systems. Following that paper and the ensuing discussion will be papers on software and data bases, interactive library processing and on-line retrieval.

There will be an hour-and-a-half lunch break, at which time attendees can leave the Disneyland Convention Center and see the FJCC exhibits in the nearby Anaheim (Calif.) Convention Center.

In the afternoon, state-of-the-art papers on information retrieval, abstracting and indexing, library management, and the future of inter-library communication will be presented.

Afips announced that one-day attendees, who pay $15 for exhibits and the technical program, are entitled to attend all or part of the vertical adjunct program being planned for the day.

The adjunct programs are scheduled for Tuesday and Wednesday, Dec. 5-6, the first two days of the three-day conference.

In addition to the information data center program, the seminar on medicine and health care will be held on opening day. The seminars on manufacturing and banking will be conducted Wednesday.

The seminars, Afips said, are an attempt to "promote a better understanding" of computer applications in the four selected areas, as well as to "build an increased dialogue" between computer specialists and users.

Full details are available from Afips headquarters, 210 Summit Ave., 07645.

NAS Official Tapped For 'Joint' Luncheon

CAMBRIDGE, Mass. – The chairman of the National Academy of Science (NAS) Computer Science and Engineering Board, Dr. Anthony G. Oettinger, will deliver the luncheon address at FJCC.

Speaking on "information technologies and public policy," Oettinger is expected to comment on the recent data bank study completed by a subgroup of the NAS board.

Oettinger is former president of the Association for Computing Machinery, and is currently professor of Linguistics and Gordon McKay Professor of Applied Mathematics at Harvard.

The luncheon will be part of the final-day activities of the conference, Dec. 5-7. There will be no keynote speaker, but Oettinger's topic is more in the keynote vein than the usual "entertaining" speeches given during other JCC luncheons, sources said.

Call for Papers

1973 SUMMER COMPUTER SIMULATIONS, July 17-19, Montreal, Canada.

The conference will emphasize the application of simulation to solve problems in the technical, management and social sciences, as well as recent advances in computer methods and hardware. Topics include validation of simulation models, languages and tools, and applications. A 3- to 5-page summary should be submitted to the program chairman by Dec. 1, 1972, and the completed manuscripts are due March 15, 1973.

For further information and requirements contact the program chairman: Dr. Richard J. Sylvester, General Research Corp., P.O. Box 417, Denville, N.J. 07834.

SYMPOSIUM ON MINICOMPUTERS—TRENDS AND APPLICATIONS, April 4, 1973, Gaithersburg, Md.

Papers are invited describing trends in minicomputer design and economics from a user's point of view, trade-offs in the use of minis versus time-sharing, and applications in the fields of design, medicine, transportation, education and process control.

Abstracts of approximately 1,000 words should be sent to Dr. Marshall Abrams, Box 639, Silver Spring, Md. 20901, before Dec. 15, 1972.

DPMA, Afips Fill Executive Openings

By a CW Staff Writer

PARK RIDGE, Ill. – Two of the largest computer organizations have hired new executive-level people to replace headquarters personnel who were fired or who resigned earlier in the year.

At the Data Processing Management Association (DPMA) here, Donn W. Sanford has been appointed executive director of the 28,000-member group.

Sanford, 32, has served with three associations over the past five years, DPMA said, noting his selection was based on a record of new educational programs, financial management, member communications and new member enrollment.

Afips Hires Manager

The American Federation of Information Processing Societies (Afips) has hired a conference manager to replace exhibit manager Donald R. Cruzen, whose job was abolished last summer.

Gerard L. van Dijk has assumed responsibility for all the Afips staff activities pertaining to the Naional Computer Conferences which start next year.

Van Dijk's 15 years in the computer industry included sales management for Ticketron and the and the vice-presidency of a software firm.

Two other major societies have appointed conference chairmen for upcoming annual meetings.

Dr. Sidney Fernbach, head of the computation department at Lawrence Livermore Laboratory, Palo Alto, Calif., will chair Compcon 73, the international conference of the IEEE Computer Society, which will take place in San Francisco.

The Association for Computing Machinery has selected Dr. Irwin E. Perlin of the Georgia Institute of Technology to head ACM '73, which will be held in Atlanta.

Hardware Group Views Software

BROOKLYN, N.Y. – The IEEE Computer Society will break away from its traditional orientation to hardware next Spring, when it sponsors the First Symposium on Computer Software Reliability.

Both theoretical and practical sessions are planned in various application areas, IEEE said.

Researchers and management personnel were invited to submit papers for the meeting, Apr. 30 – May 2 at the Americana Hotel in New York City. Paper abstracts were requested "immediately," with final manuscripts due Nov. 27, to Prof. M. Shooman, Polytechnic Institute of Brooklyn, 333 Jay St., 11201.

MDs Find Selves

WILLIAMSBURG, Va. – Trying to "find themselves" may be a problem for philosophers, but medical doctors will be hoping to accomplish the same thing here this week.

"The Blueprint – Where do we fit into the building plans?" is the theme for the second national conference of the Society for Computer Medicine, scheduled for Nov. 9-10 at the Williamsburg Conference Center.

CI Notes

HP Slashes Mini Prices

CUPERTINO, Calif. – Hewlett-Packard has reduced core memory prices for minis by 20% and announced new OEM and end-user discount schedules.

The reductions, made possible by "significant manufacturing savings," mean that 8K of memory costs $5,000 and 32K costs $20,000, down from $28,000. OEM discounts range from 15% for one to 32% for quantities of 25.

End-user discounts range from 2% for quantities of two to 17% for end-user quantities of 25. By combining the reductions in core prices with the discounts, a 2100A mini with 16K of core for one now sells for $11,680, for example, compared with $17,750 before, a savings of 52%, the firm said.

Swift Plans DP Entry

CHICAGO – Another large company now plans to spin off its DP operation into a separate company offering a "full line" of information services.

Swift & Co. said the new firm, Globe Decision Services Inc., will be directed by James Van Wagenen and will have 13 computer systems and an information service staff of over 300 in 29 locations.

Pertec Drops Executives

LOS ANGELES – The Pertec annual meeting has been postponed indefinitely and two directors – Robert A. Kleist and Stuart Mabon – have been fired as vice-presidents by the firm's president, Harold Kurth.

Kleist and Mabon had sought the ouster of Kurth as president and the board of directors was evenly split on the question.

Supershorts

The trial date in the Control Data antitrust action against IBM has been pushed back to Nov. 5, 1973, by the Federal District Court in Minnesota. Originally the judge had ordered the parties to be ready for trial in May 1973.

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Kennedy Co., Altadena, Calif., has formed a Computer Peripherals Products Division for the design and manufacture of end-user products. The firm previously concentrated on the OEM business.

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Diablo Systems has begun deliveries of its Series 40 disk drive, a 200 track/in. unit for minicomputers.

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Sycor has won the President's E award for "noteworthy contributions" to the expansion of U.S. exports. The firm has shipped more than 3,000 of its terminals overseas since mid-1969.

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Telex Corp. has initiated a scholarship program at Oklahoma State Tech College for minority group students from the Tulsa area.

Adapso Charges:

Six IBM Marketing Practices Unfair

By Michael Merritt
Special to Computerworld

SAN FRANCISCO – IBM was charged with six unfair marketing practices in a draft complaint presented at the annual meeting of the Association of Data Processing Service Organizations (Adapso).

The working paper, concerned with IBM's effect on the data center and software products and services segments of the industry, included these points:

- IBM buries the cost of "allegedly free products and services" in hardware costs, eliminating competition in areas such as bundled software and data center services for conversion.
- IBM uses tic-in sales – requiring customers to buy two products together – a monopolistic technique. Adapso officials cited Installed User Program (IUP) sales and program products that require excessive hardware as examples.
- IBM does not freely provide adequate and timely interface information for new products, reducing the time during which independents can market competing products. Adapso members said they still have no hard information on the workings of virtual memory, announced officially several months ago.
- IBM announces products and services before they are available, and before announcing products "conditions the marketplace" through a "whisper campaign" concerning new products – both practices that decrease the market life of competing products.
- IBM modifies its products and services in order to affect the marketplace, not to provide better service to users, forcing independent competitors to continually change their products to interface with IBM.
- IBM has a policy of "unnecessary" planned obsolescence, and that lack of compatibility between new products artificially increases the market size by making extensive conversion necessary.

The working paper was written by a group of Adapso members last September, following a survey of the organization. An official from the Justice Department, which is currently prosecuting an antitrust suit against IBM, attended the drafting session.

Adapso officials stressed that the paper is still incomplete, and subject to revision. When finished, and if adopted by the organization, it may be used in connection with the IBM antitrust suit.

Areas of Relief

The paper suggested three areas of relief that would help the independents: individual pricing of all products and services, a ban on tie-in sales and a ban on preannouncement of products. It included no suggestions on implementation, since the Justice Department recently filed in court a preliminary memorandum of relief [CW, Oct. 25].

Several possible means were mentioned by L.A. Welke, president of International Computer Programs Inc., and a member of the drafting committee, in his presentation of the paper. He said the problems of regulating IBM without establishing a new governmental body were great, but potential techniques include injunctive relief, divestiture – breaking up IBM into several smaller IBMs – and "maximum separation" – breaking IBM into separate corporate entities for hardware, software, service, etc., each almost completely divorced from the others, and with separate accountability.

In presenting the session on the position paper, Charles D. Palmer of Boeing Computer Services said the drafting team "tried to include the position of the user community, whose support we must eventually engage."

Adapso General Counsel Milton R. Wessel mentioned several times that the Justice Department team prosecuting IBM is badly understaffed, and needs help from the computer community. As well as specific evidence on monopolistic actions, Wessel said, the Justice Department needs professional help from lawyers and economists.

Industry Execs Press Justice For Interim Relief From IBM

NEW YORK – Top executives from more than 50 computer industry firms – from independent peripherals makers to software houses – last week called on the Justice Department to "change its timing and strategy in the IBM antitrust suit."

The executives, who participated in a series of meetings sponsored by the Computer Industry Association (CIA), asked the government to seek an interim solution and to investigate with the entire computer industry any negotiated settlement designed for the long-term solution to the case.

The group – which represented companies with combined annual revenues of over $2.5 billion – agreed that the aim of the government suit – breaking up IBM – was sound, a spokesman for the association said.

But the group also agreed that the government's action – if successful – would not bring a change to the industry for five more years.

Therefore, the executives called for an early measure of relief – interim measures – to "prevent the destruction of the non-IBM portion of the industry while the Justice Departmenr pursues its more long-range objectives," the spokesman said.

"These meetings resulted in general recognition that the Antitrust Division is set on a course that will not bring help for many years," according to Dan McGurk, association president.

"The executives attending our meetings appeared to agree that before the government suit is over, the predatory practices of IBM will force many companies out of the business," he added, noting that RCA and GE had both dropped out of the business after the suit was filed almost four years ago.

The group agreed the most likely solution to the IBM case would be a consent decree entered into by both IBM and the government. The executives also called for further investigation of the possible effects of such a decree on the rest of the business.

The meetings were held in secret, but a partial list of attendees included representatives from Boothe Computer Leasing, Informatics, Calcomp, Computer Machinery Corp., Electronic Memories and Magnetics, Applied Data Research and Mohawk. The meeting was open to all industry firms and not limited to CIA members.

Justice Lawyer Sees Antitrust Problems With Remote Nets

WASHINGTON, D.C. – The establishment of specialized national remote-access computer services raises new questions of antitrust policy, according to Donald I. Baker, a lawyer with the Antitrust Division of the Justice Department.

"From the standpoint of antitrust, it is desirable that these remote-access data processing services be offered on a competitive basis," he said, noting that "competition is the cornerstone of our national economic policy."

But at the same time, he indicated there would be certain situations with systems of this kind where a company "has a legal monopoly in a specialized field either because the market is a natural monopoly market or because of the entrepreneur's skill, foresight and industry."

If such monopolies develop in the computer services area, Baker indicated they would have to follow the basic principle of "equal treatment for all comers. Late comers cannot be excluded if the facility can be fashinoned to accommodate them, although it may be only fair that the newcomer should pay rather more for the new facility than those who have invested over a long period."

AT&T's Entry Into CRT Market Bound to Be Noticed

By Ronald A. Frank
Of the CW Staff

NEW YORK – AT&T's announced entry into the CRT market [CW, Oct. 25] will not go unnoticed by the display terminal vendors who will be directly affected.

If Bell files a tariff for its Dataspeed 40 service, the immediate question will be whether the telephone company is entering the data processing equipment market or whether it is simply enhancing its well-established teletypewriter technologies. There is no easy answer.

Under the 1956 Justice Department consent decree, AT&T can only introduce equipment directly related to its primary business of communications. And the business and accounting offices of the Bell operating companies have been using displays for some time. In fact New England Bell was one of the first major users of the Viatron display system several years ago.

But in the DP industry a CRT is classified as a computer peripheral. It accepts data from a keyboard for entry into a CPU and it displays data generated by a CPU. In such an environment it is strictly a computer-oriented device with incidental communications capability.

In any regulatory hearings that develop on a Dataspeed 40 tariff, Bell will undoubtedly argue it is simply adding a soft printing capability to its TTYs; the fact

Analysis

that CRT/teletypewriters are also used as CPU terminals has no bearing on their primary use in message communications.

If the Dataspeed 40 is priced competitively with existing display systems (and competition is very much on AT&T's mind these days) the CRT vendors can be expected to object vigorously.

It is difficult to predict the outcome of such a challenge. One regulatory expert said a compromise might result that would allow Bell to provide CRTs used for remote transmissions to a CPU while prohibiting the phone companies from installing displays designed strictly for local access to an in-house computer. But such a division of applications would be difficult to monitor and perhaps impossible to enforce, he added.

IBM Watching

One of the vendors that will be watching the introduction of the Dataspeed 40 very carefully is IBM. It has often been said by industry observers that AT&T and IBM have agreed unofficially not to enter each other's markets. But a Bell CRT would compete directly with IBM 2260s, 2265s or other displays, depending on price and capabilities.

Some observers believe any Dataspeed 40 introduction would be followed by IBM "retaliation" in the form of its 2750 and/or 3750 computerized PBX, now available only outside the U.S. But others discount this theory pointing out that IBM is its own master and doesn't have to react to anyone including AT&T.

Reports persist that IBM is paying more and more attention to the PBX market. Some users have been given proposals to use a System/7 to control a PBX and a 3750 is reported to be operating at a domestic IBM facility.

The IBM PBX effort in this country reportedly is known as "Project Carnation" within the company. An IBM spokesman said he knows of no 3750 installation in the U.S.

No one is ready to predict the Dataspeed 40 will trigger a regulatory conflict, and IBM's plans as usual are cloaked in secrecy. But the AT&T CRT will be watched with great interest by many in the industry.

Orders & Installations

Wesleyan University has installed a Digital Equipment Corp. Decsystem-1040 for academic and administrative use.

Statistical Computing Center, Inc., Oklahoma City, has ordered a Honeywell 3200 to replace a Honeywell 1250.

Pace College in New York City has ordered a Univac 1106, which will also handle student work at an extension campus in Westchester County.

General Electric Co. has ordered dual Systems Engineering Laboratories, Inc. System 86 computers for use in a pilot training program for the Air Force.

Fisher Brothers discount department store chain has ordered 60 NCR 280 data terminals.

Stainless Metal Products, Inc. has installed a Univac 9211 for use in inventory control, shop loading, general accounting and payroll.

Ten Bonwit Teller stores have ordered Credit Systems, Inc.'s Credit-Chek authorization and check cashing system.

Pitney Bowes-Alpex has installed a Super/Spice electronic register system in an outlet of Chatham Supermarkets, Inc.

Computility has ordered $250,000 worth of equipment from Digital Equipment Corp. to upgrade its present Decsystem-1070.

American Agronomics Corp. has ordered a Honeywell Series 2000 system to aid in the management of 30,000 acres of orange groves.

The Region IV Education Service Center, Houston, has installed a Control Data Corp. 6600 system valued at $2.4 million to expand its multi-school district DP services.

The University of Florida has installed an IBM 370/165 which will serve the regional education network for North Florida and handle class registration for several state universities and community colleges.

Foster Wheeler Corp. has added an Ampex Model ECM-50 memory to its IBM 360/50, which is used for engineering and general data processing.

Bright Future Looms for Paper Makers in Europe

LONDON – The European market for paper media products will grow 22% to $782.4 million in 1973 from its base of $595.2 million in 1971, according to a recent study by IDC Europa Ltd., a market research firm.

The largest part of current expenditures was for continuous stationery for the output sector, which will probably also experience the highest growth rate, the study observed. In 1971, $454.9 million was spent on output media, and this figure is expected to expand by 34% to $631.6 million by 1973.

Per-Site Costs

The average per-site expenditure in Europe on output media rose by 16.9% between 1970 and 1971, to about $21,600. Actual expenditure, however, rose by 34% during the same period, reflecting increased number of sites. By year-end 1973, this figure is expected to grow another 37.4% to $622 million, the report said.

The average per-site expenditure on punched cards and paper tape, however, remained static during 1970 and 1971, the report said, but should rise by 7.4% to $6,960 per year by 1973.

Within the last two years, actual expenditures rose 16.9% to $142.3 million, and the figure is expected to rise by 11.6% to $158.6 million by the end of 1973, according to the study.

The study estimates that 88% of the 21,846 mainframe sites in western Europe use punched cards, 28% use paper tape and 96% use continuous stationery and printer ribbons.

Breaking down expenditures by regional markets, IDC Europa found lower than average expenditures on input media in the UK, which it suggested resulted from the influence of domestic manufacturers' support of paper tape usage.

Sites in the UK averages $5,280 a year on input media, while in other European countries outside the Common Market the figure is $5,710.

Higher expenditures occurred in card-oriented Common Market countries, where the average site expenditure reached $6,190 a year, the report said.

Largely Segmented

Examining the three market areas, the UK, the Common Market and Greece and Spain, the report found largely segmented markets with active local suppliers.

In the UK, however, the three largest suppliers of punched cards, IBM, ICL and CDC, retain 98.5% of the market, with IBM just nosing out ICL for the lead.

The paper tape market shows a multitude of domestic suppliers, with only two having greater than a 10% market share.

Continuous stationery consumption continues to grow, and a 45.2% growth between 1970 and 1973 in total annual expenditure in the UK is forecast for paper and ribbons, or a total over $122.5 million.

Because much of the work in the stationery field is of a specialist nature, in forms design, etc., the field is relatively free of price cutting, in contrast to printer ribbons, where "price cutting is an accepted market factor," according to the report.

Countries in the Common Market have a higher average consumption of input media products than other European countries, and suffered relatively less from the recession, the report noted. These two factors should help make this the "primary market for newer 'more sophisticated' data capture products," according to the report.

While the average European Economic Community (EEC) site expenditure on input media continues to grow at an increasing rate, 3.6% in 1971 and 6.9% projected for 1973, the growth in total expenditure is expected to slow from 21.9% in 1971 to 10% in 1973.

The report said this could mean the market as a whole is reaching its saturation point in this geographic/economic area, or, possibly, that the market is "settling down and that users have a realistic concept of possible price increase over the next two years."

IBM holds a clear lead in supplying punched cards, with a 50.6% market share. Singer Friden is the only supplier of paper tape with a market share greater than 1%, with 13.7%.

Only three companies have a significant share of the stationery market, combining for 30.9%.

In the third market segment, Spain and Greece, the average user spent $6,480 on input media in 1971, significantly higher than that of the UK.

Although the growth in average annual expenditure on paper tape and cards is projected to decline from 6.9% to 3.7% between 1971 and 1973, the growth in total annual expenditure is pegged at rising from 4.3% to 14.2% in the same period.

IBM retains 57% of the total punched card market, while the paper tape market is far more fragmented.

Computer Systems 'Rapidly' Growing Instrument Category

NEW YORK – Computer systems should be the "most rapidly growing product group" in the analytical instrument field, according to Frost and Sullivan, a market research firm here.

The firm predicted that sales of computer systems in this marketplace would rise from $65 million in 1971 to $95 million by the end of 1973 and should top $150 million by 1976.

In the next five years, the firm predicted almost another doubling in volume, indicating sales of computer systems valued at $290 million by the end of 1981.

"Analytical instruments are used to measure and analyze almost every facet of man's material life – his water, food, blood, medicines, fabrics, his machines and the air he breathes," the firm said.

At the same time, the firm indicated "the analytical instruments market has been changing from the use of highly manual operator-controlled devices to more automatic and faster instruments.

"The bulk of recently introduced instruments is computer oriented or at least equipped with a digital interface," it added.

25% Growth

Because of this, Frost and Sullivan said computer systems are "one of the most rapidly growing" of the analytical instrument groups, and predicted a growth rate of 20% to 25% annually over the next few years.

"The computer controls the data system, adds memory and flexibility, and also helps collect and process instrument data. Thus, improved performance, shorter processing time and higher reliability all result from computer control of analytical instruments," the firm said.

Floppy Disk System Has Moving Head

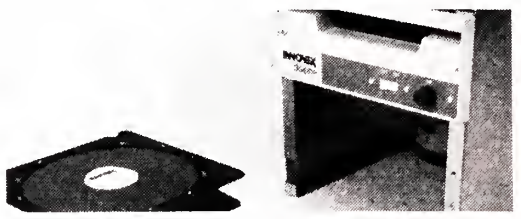
BEDFORD, Mass. – Innovex Corp. has introduced a random-access floppy disk memory system that leaves the disk stationary and spins the read/write head at 400 rpm.

The cartridge is a sheet of magnetic tape stretched in a 9-in. by 11-in. by 1/4-in. plastic frame. Sixty-four circular tracks on the tape store 1 Mbit of information, the firm said.

Track-to-track positioning of the read/write head is provided by a rack and pinion mechanism and a stepping motor. Amplified signals from the disk are picked up by a technique similar to that developed for video tape recorders.

The Diskette system offers a transfer rate of 105,000 bit/sec, a 5 msec track-to-track access time and a 25 msec head setting time.

The drive sells for $990 in single units and $500 in OEM quantities. The cartridge sells for less than $7 each in quantities from 4 Alfred Circle, 01730.



Innovex Diskette System

New OEM Products

Litton Printer Improved

CARLSTADT, N.J. – A new version of the Model 30 serial impact printer from the OEM Products Division, Litton ABS carries a $1,123 price tage for the complete package.

Standard features include: 30 char./sec print speed, 47 print characters, tabulation, forward and reverse, tractor drive with vertical format control, front feed form insertion and outputs up to six copies.

Any or all of the component parts and assemblies are available separately from 600 Washington Ave., 07072.

Other OEM Products

Pioneer Magnetics, Inc., Santa Monica, Calif., has added an uninterruptible power supply for volatile semiconductor memory systems to its PM 2400 line of OEM multiple output computer power supplies.

– – –

Datacraft Corp., Fort Lauderdale, Fla., has developed an asynchronous interface controller comprised of two distinct receiver and transmitter sections. The Model 9020 controller converts asynchronous 5-, 6-, 7- or 8-level serial codes to parallel data and vice versa and will handle 12 different hardware selectable baud rates.

– – –

Intel Corp., Santa Clara, Calif., has introduced a set of Proms that enable an MCS-4 microcomputer prototype to assemble programs for itself.

Contracts

The city of San Bernardino, Calif., has signed a $1 million contract with Xerox Computer Services covering responsibility for the city's DP operations for three years and installation of a centralized municipal information system.

Consolidated Computer Inc. and International Computers Ltd. have extended their existing contracts until at least mid-1975, with an agreement valued at $20 million.

Optical Scanning Corp. has received a contract from the U.S. Navy for 30 Op-Scan 17 Optical Scanning Systems, valued at $250,000. The systems will be used to process pilot evaluation forms.

Interdata, Inc. has been awarded a $372,000 contract from Interstate Electronics Corp. for 12 Model 4 systems, which will be used in support of weapons systems being produced by the U.S. Navy.

Tally Corp. has sold 100 of its Model 2100 line printers to the Johnson Service Co., Milwaukee, for use with Johnson's JC-80 computer-based automatic environmental control systems.

Shared Medical Systems Corp. has signed contracts with eight hospitals to provide them with data communications programs, including a financial management system.

Antekna, Inc. has been awarded a Navy contract valued at over $750,000 for a computerized electromagnetic simulator system for training personnel.

NCR has received a $100,00 contract from the Navy to adapt the color-bar code used in NCR electronic retail systems for use in a parts identification system.

General Waterworks Data Service Corp. has selected Management and Computer Services, Inc. to handle its DP operation under a five-year facilities management contract.

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Record-Setting Reports

Minimakers Show Rising Earnings, Sales

Not to be outdone by mainframe manufacturers posting record highs for recent periods, three minicomputer manufacturers, General Automation, Inc., Interdata and Computer Automation, Inc., have also posted sharply improved results.

General Automation concluded the year ended July 31 with record sales and earnings; Interdata posted record third-period and nine-month revenues, while Computer Automation showed first-quarter sales rising 280%.

At General Automation, earnings for the year, including a $649,270 tax credit, totaled $1.6 million, or 81 cents a share, compared with 1971's $3,100 earnings.

Revenues Up 51%

Revenues rose 51% to $16 million from $10.6 million last year.

The fourth quarter was also strong, with revenues of $5.4 million and earnings of $655,000 including $207,000 in special credit.

As of July 31, General Automation had a backlog of about $6.6 million compared with $2.2 million a year ago.

All operating areas are "up substantially this year and showing excellent growth," according to President Lawrence A. Goshorn.

Interdata's third-quarter revenues rose 25% to a record $3.3 million from $2.6 million posted a year ago.

Earnings, including an $81,000 special credit, totaled $236,800 or 12 cents a share in the period ended Sept. 29, compared with $108,800 or 6 cents a share in the year-ago period.

$9 Million in 9 Months

In the nine months, Interdata's revenues reached record $9.3 million, up 49% from the $6.2 million reported in the same 1971 period.

Earnings, including a $349,700 special credit, totaled $694,700, or 18 cents a share, in contrast to last year's loss of $2,300.

Order backlog at the end of the third quarter was $4.2 million, up from $3.1 million at the same time last year.

Computer Automation, Inc. is rolling its Naked Minis off the assembly line and shipping them out at a rapid rate. In the quarter ended Oct. 1, 320 units were shipped compared with 550 in all of last year.

At the same time revenues rose to $2.2 million from $768,000 in the comparable 1971 quarter, a 28% increase.

Including a tax/credit, earnings for the period totaled $340,000, or 23 cents a share, a 723% gain over the $47,000, or 4 cents a share earned last year.

"We will continue to be a strictly OEM supplier, selling our minicomputers to well-established systems manufacturers," noted President David Methvin. This policy, he explained, enables the company to market its computers into numerous industries with "simply one marketing force."

Nickels & Dimes

With help from its special offerings, **Rockwood Computer** has reduced the principal amount of 7% senior debentures outstanding from $21 million in March to $12.3 million, enabling it to release 1.2 million shares of subsidiary National Equities Inc. which it had pledged as security. Rockwood also ended "several restrictive covenants" such as on mergers and borrowings.

$$$

Startup charges associated with a terminal system were responsible for third quarter loss at **Raytheon Data Systems.**

$$$

Xerox reported record earnings and sales for the third quarter and nine months, with "modest" gains in computer revenue.

$$$

Recognition Equipment plans to readopt its fledgling, Corporation S. and write down its accounts receivable from same, which will have a "significant" negative effect on 1972 earnings.

Trilog Associates' revenues declined 26% in the year ended July 31, but revenues from proprietary software and related services rose 83% and the facilities management and other long-term service sector rose 35%. The decline stemmed from custom systems engineering and other short-term work, the firm said.

$$$

President Ray Macdonald predicted **Burroughs** will earn about $4.50 to $5 a share in 1972, even after a special charge of 26 cents a share resulting from settlement of a lawsuit with TWA.

$$$

Milestone – **Pitney Bowes-Alpex** decided it had reached "normal levels of commercial operations" on Oct. 1, and income and expenses will no longer be deferred. Previous expenses, which totaled $18.6 million, will be amortized by charges to income over a five-year period effective Oct. 1.

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Computerworld Stock Trading Summary

All statistics compiled, computed and formatted by TRADE★QUOTES, INC Cambridge, Mass 02139

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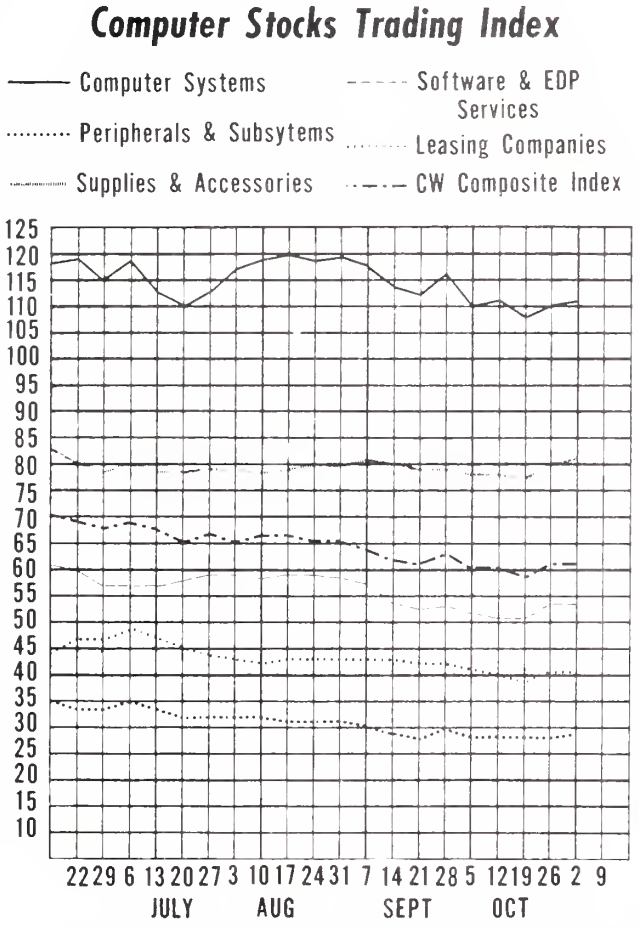
EXCH		1972 RANGE (1)	CLOSE NOV 5 1972	WEEK NET CHNGE	WEEK PCT CHNGE
	SOFTWARE & EDP SERVICES				
O	ADVANCED COMP TECH	1- 3	2 1/4	0	0.0
A	APPLIED DATA RES.	4- 7	4 1/4	+ 1/8	+3.0
O	APPLIED LOGIC	1- 4	2 3/4	0	0.0
N	AUTOMATIC DATA PROC	72- 99	98	+1 1/8	+1.1
O	BRANDON APPLIED SYST	1- 2	1	0	0.0
O	COMPUTER DIMENSIONS	6- 14	6	- 3/8	-5.8
O	COMPUTER DYNAMICS	1- 4	1 3/8	0	0.0
O	COMPUTER NETWORK	3- 7	3 1/4	- 1/2	-13.3
N	COMPUTER SCIENCES	4- 10	4 7/8	- 1/4	-4.8
O	COMPUTER TASK GROUP	1- 2	1	0	0.0
O	COMPUTER TECHNOLOGY	4- 8	4	0	0.0
O	COMPUTER USAGE	7- 14	7 3/4	-1 1/8	-12.6
O	COMP AUTOMOT REPORTS	5- 9	8 1/2	+ 1/4	+3.0
N	COMPUTING & SOFTWARE	14- 28	14 5/8	+ 3/8	+2.6
O	COMRESS	1- 3	1 1/4	0	0.0
O	COMSHARE	5- 10	8 5/8	+ 7/8	+11.2
O	DATATAB	5- 9	4 1/2	0	0.0
O	EDP RESOURCES	2- 8	3 1/4	+1	+44.4
A	ELECT COMP PROG	1- 5	1 5/8	+ 1/4	+18.1
N	ELECTRONIC DATA SYS.	43- 65	52 1/2	+2	+3.9
O	INFORMATICS	5- 11	5 5/8	+ 1/4	+4.6
O	I.D.A. DATA CORP	1- 3	5/8	- 3/8	-37.5
O	KEANE ASSOCIATES	4- 7	4	0	0.0
O	KEYDATA CORP	7- 13	11 3/4	- 1/4	-2.0
O	LOGICON	4- 9	5 5/8	- 1/8	-2.1
A	MANAGEMENT DATA	4- 10	4 5/8	+ 3/8	+8.8
O	NATIONAL CSS INC	8- 31	29 5/8	+2 1/2	+9.2
O	NATIONAL INFO SRVCS	2- 5	1 3/4	- 1/8	-6.6
P	UN LINE SYSTEMS INC	8- 25	25	+2 3/4	+12.3
N	PLANNING RESEARCH	6- 17	6 3/4	0	0.0
O	PROGRAMMING METHODS	20- 24	23 1/4	+1 3/4	+8.1
O	PROGRAMMING & SYS	1- 2	1 3/8	+ 1/8	+10.0
O	RAPIDATA INC	5- 27	26 1/2	+3 1/4	+13.9
O	SCIENTIFIC COMPUTERS	2- 4	2	0	0.0
O	SIMPLICITY COMPUTER	1- 5	3 1/4	- 1/8	-3.7
O	TBS COMPUTER CENTERS	3- 6	3 1/4	0	0.0
O	TCC INC	1- 3	3/4	- 3/8	-33.3
O	TYMSHARE INC	7- 11	9 3/8	+ 3/8	+4.1
O	UNITED DATA CENTER	5- 8	6 1/4	0	0.0
N	UNIVERSITY COMPUTING	10- 26	11 1/4	-1 1/4	-10.0
A	URS SYSTEMS	6- 10	8	+ 1/4	+3.2
	PERIPHERALS & SUBSYSTEMS				
N	ADDRESSOGRAPH-MULT	34- 49	36 1/2	-3 5/8	-9.0
O	ADVANCED MEMORY SYS	12- 23	18 3/4	+ 1/2	+2.7
N	AMPEX CORP	5- 15	7 3/8	+1 1/4	+20.4
O	ANDERSON JACOBSON	5- 8	4 1/4	+ 3/4	+21.4
O	ATLANTIC TECHNOLOGY	1- 11	1/4	0	0.0
O	BEEHIVE MEDICAL ELEC	1- 6	5 3/4	- 1/2	-8.0
A	BOLT,BERANEK & NEW	5- 21	13 1/2	-1 1/8	-7.6
N	BUNKER-RAMO	9- 14	9 3/4	0	0.0
A	CALCOMP	10- 25	10 3/4	+ 1/4	+2.3
O	CAMBRIDGE MEMORIES	9- 15	10 7/8	+1 1/8	+11.5
O	CENTRONICS DATA COMP	6- 27	21 1/2	0	0.0
O	COGNITRONICS	2- 5	2 3/8	+ 1/8	+5.5
O	COMPUTER COMMUN.	1- 7	2 7/8	- 1/8	-4.1
A	COMPUTER EQUIPMENT	3- 4	2 3/4	+ 1/8	+4.7
O	COMPUTER MACHINERY	7- 13	10 3/8	+1	+10.6
A	COMPUTEST	3- 9	4 3/8	+ 1/2	+12.9
A	DATA PRODUCTS CORP	3- 7	3 5/8	- 1/4	-6.4
O	DATA RECOGNITION	1- 5	3/4	- 1/2	-40.0
O	DATA TECHNOLOGY	2- 5	2 1/2	- 1/8	-4.7
O	DI/AN CONTROLS	0- 8	4 3/8	- 1/8	-2.7
N	ELECTRONIC M & M	3- 8	4 3/4	+ 1/2	+11.7
O	FABRI-TEK	2- 5	3 1/4	- 1/4	-7.1
O	GENERAL COMPUTER SYS	7- 16	7 3/4	+ 1/4	+3.3
N	GENERAL ELECTRIC	59- 70	65 1/4	+1 3/8	+2.1
N	HAZELTINE CORP	7- 13	8 1/8	+ 3/8	+4.8
O	INFOREX INC	20- 36	20 1/2	+ 1/2	+2.5
O	INFORMATION DISPLAYS	1- 5	1 1/2	- 1/8	-7.6
A	LUNDY ELECTRONICS	9- 14	9	- 3/8	-4.0
O	MANAGEMENT ASSIST	1- 2	1/2	+ 1/8	+33.3
N	MEMOREX	16- 38	19 1/8	-2 3/8	-11.0
A	MILGO ELECTRONICS	15- 44	16 7/8	+ 7/8	+5.4
N	MOHAWK DATA SCI	14- 27	15 3/4	- 5/8	-3.8
O	OPTICAL SCANNING	6- 16	5 3/4	- 3/4	-11.5
O	PERTEC CORP	8- 17	8 7/8	+ 1/4	+2.8
O	PHOTON	6- 15	7 5/8	- 3/4	-8.9
A	POTTER INSTRUMENT	7- 21	8 7/8	+1 1/8	+14.5
O	PRECISION INST.	4- 13	4 1/4	- 1/4	-5.5
O	RECOGNITION EQUIP	5- 15	6 5/8	+1 3/8	+26.1
N	SANDERS ASSOCIATES	13- 21	14 7/8	+ 3/4	+5.3
O	SCAN DATA	5- 13	5	+ 1/8	+2.5
O	STORAGE TECHNOLOGY	17- 39	28 3/8	+1 1/8	+4.1
O	SYCOR INC	7- 11	11	+1 1/4	+12.8
O	TALLY CORP.	8- 15	11 1/4	+ 3/8	+3.4
N	TEKTRONIX INC	34- 64	50 7/8	0	0.0
N	TELEX	6- 15	6 5/8	- 3/8	-5.3
O	WILTEK INC	10- 26	13 1/2	-2	-12.9
	SUPPLIES & ACCESSORIES				
O	BALTIMORE BUS FORMS	6- 9	6 3/4	- 1/4	-3.5
A	BARRY WRIGHT	9- 14	11 1/2	+ 1/8	+1.0
A	DATA DOCUMENTS	17- 26	20 3/4	- 1/4	-1.1
O	DUPLEX PRODUCTS INC	8- 16	8 3/4	+ 1/4	+2.9
N	ENNIS BUS. FORMS	6- 10	6	0	0.0
O	GRAHAM MAGNETICS	15- 27	16 7/8	-1 1/2	-8.1
O	GRAPHIC CONTROLS	12- 15	13 1/4	- 1/8	-0.9
N	3M COMPANY	76- 85	84 5/8	+2 3/4	+3.3
O	MOORE CORP LTD	42- 56	53 3/4	+2 3/4	+5.3
N	NASHUA CORP	48- 62	57 1/4	- 3/4	-1.2
O	REYNOLDS & REYNOLD	37- 77	45 3/4	+1 3/8	+3.0
O	STANDARD REGISTER	14- 20	16	+ 1/4	+1.5
O	TAB PRODUCTS CO	14- 23	22 1/2	+1 1/2	+7.1
N	UARCO	21- 28	21 7/8	0	0.0
A	WABASH MAGNETICS	6- 11	7 3/8	+ 1/2	+7.2
N	WALLACE BUS FORMS	21- 26	23 1/4	- 5/8	-2.6
	COMPUTER SYSTEMS				
N	BURROUGHS CORP	147-226	224 3/4	+2 1/4	+1.0
N	COLLINS RADIO	14- 20	16 1/8	+1 5/8	+11.2
N	CONTROL DATA CORP	43- 78	61	-5 3/4	-8.6
O	DATA GENERAL CORP	56-115	110	0	0.0
O	DIGITAL COMP CONTROL	9- 25	8 1/2	0	0.0
N	DIGITAL EQUIPMENT	72-101	87 1/8	+1 7/8	+2.1
N	ELECTRONIC ASSOC.	6- 13	8 5/8	- 1/8	-1.4
A	ELECTRONIC ENGINEER.	6- 14	8 1/8	- 1/4	-2.9
N	FOXBORO	23- 41	25 1/2	+2 1/4	+9.6
O	GENERAL AUTOMATION	13- 39	39	+5 3/4	+17.2
O	GRI COMPUTER CORP	2- 5	2 3/4	+ 1/8	+4.7
N	HEWLETT-PACKARD CO	46- 77	71 5/8	+2 5/8	+3.8
N	HONEYWELL INC	122-170	134 1/2	+7 3/4	+6.1
N	IBM	333-426	391	+13 1/2	+3.5
O	INTERDATA INC	8- 16	11 1/8	- 1/2	-4.3
O	MICRODATA CORP	5- 10	8	0	0.0
N	NCR	29- 38	34	- 1/2	-1.4
N	RAYTHEON CO	27- 47	29 3/4	+1 1/8	+3.9
N	SPERRY RAND	30- 48	48 3/8	+1 1/8	+2.3
A	SYSTEMS ENG. LABS	8- 16	7 7/8	- 3/4	-8.6
N	VARIAN ASSOCIATES	14- 22	20 1/8	-1	-4.7
N	VICTOR COMPTOMETER	15- 24	16 1/8	- 5/8	-3.7
N	WANG LABS.	23- 61	28 7/8	+2 5/8	+10.0
N	XEROX CORP	121-172	157 1/4	-3	-1.8
	LEASING COMPANIES				
A	BOOTHE COMPUTER	4- 18	4 3/8	- 1/8	-2.7
O	BRESNAHAN COMP.	2- 3	1 1/2	0	0.0
O	COMDISCO INC	3- 18	14 1/2	- 1/2	-3.3
O	COMMERCE GROUP CORP	5- 11	6 1/2	- 1/4	-3.7
O	COMPUTER EXCHANGE	1- 3	3/4	0	0.0
A	COMPUTER INVSTRS GRP	7- 14	7 1/4	- 1/4	-3.3
N	DPF INC	5- 13	5 1/2	0	0.0
M	DATRONIC RENTAL	2- 4	2 1/8	0	0.0
A	DCL INC	3- 10	3 1/8	-1	-24.2
A	DEARBORN-STORM	16- 26	20 1/4	+1	+5.1
A	DPA, INC.	5- 8	7 1/2	+ 5/8	+9.0
A	GRANITE MGT	5- 11	6 1/4	0	0.0
A	GREYHOUND COMPUTER	6- 11	6 3/4	+ 1/4	+3.8
A	ITEL	7- 12	9 3/4	+ 5/8	+6.8
N	LEASCO CORP	17- 24	19 7/8	+ 7/8	+4.6
O	LEASPAC CORP	6- 15	7 1/4	+ 1/4	+3.5
O	LECTRO MGT INC	1- 4	2 3/8	+ 1/8	+5.5
A	ROCKWOOD COMPUTER	2- 7	2 1/4	0	0.0
O	SYSTEMS CAPITAL	3- 20	10 1/2	- 3/4	-6.8
N	U.S. LEASING	19- 33	29 1/2	+1 3/8	+4.8

EXCH: N=NEW YORK EXCHANGE; A=AMERICAN EXCHANGE
L=NATIONAL EXCHANGE; O=OVER-THE-COUNTER
P=PHIL-BALT-WASH
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

Computer Stocks Trading Index



Earnings Reports

ENNIS BUSINESS FORMS
Three Months Ended Aug. 31

	1972	1971
Shr Ernd	$.13	.....
Revenue	10,228,055	$10,184,023
Spec Chg	.....	a1,256,655
Earnings	322,227	(1,803,010)
6 Mo Shr	.26	.....
Revenue	20,174,721	20,355,853
Spec Chg	.....	a1,256,655
Earnings	643,018	(1,799,727)

a-Writeoff on investments and advances in affiliated companies and sales and abandonments of assets of certain discontinued operations.

MENTOR
Year Ended June 30

	1972	1971
Shr Ernd	$.21	$.16
Revenue	3,205,480	1,599,099
Tax Cred	135,000	50,500
Earnings	279,524	98,495

MATHEMATICAL APPLICATIONS GROUP
Three Months Ended June 30

	1972	1971
Shr Loss	$.08	$.03
Revenue	414,208	299,801
Loss	66,719	20,866

IBM
Three Months Ended Sept. 30

	1972 (000)	1971 (000)
Shr Ernd	$2.76	$2.31
Revenue	2,333,768	2,081,545
Earnings	320,936	266,918
9 Mo Shr	8.10	6.72
Revenue	7,010,864	5,893,845
Earnings	938,841	772,827

BURROUGHS
Three Months Ended Sept. 30

	1972	1971
Shr Ernd	$.88	$.69
Revenue	250,098,000	214,764,000
Earnings	16,384,000	12,677,000
9 Mo Shr	2.63	2.21
Revenue	722,730,000	648,661,000
Earnings	48,851,000	40,548,000

TEKTRONIX
Three Months Ended Aug. 19

	1972	1971
Shr Ernd	$.41	$.24
Revenue	40,013,000	35,299,000
Earnings	3,343,000	1,936,000

DATA-DESIGN LABS
Year Ended June 30

	1972	1971
Shr Ernd	$.40	.....
Revenue	8,862,417	a$7,035,108
Disc Op	.....	(540,892)
Tax Cred	67,000	.....
Earnings	447,053	(691,316)

a-From continuing operations.

COGNITRONICS
Three Months Ended June 30

	1972	1971
Revenue	$638,615	$835,616
Loss	150,395	122,576
6 Mo Rev	1,140,581	1,624,301
Loss	293,847	298,184

ELECTRONIC ASSISTANCE
Three Months Ended July 31

	1972	1971
Shr Ernd	$.03	$.03
Revenue	9,401,000	9,153,000
Spec Cred	a15,000	b37,000
Earnings	60,000	67,000
6 Mo Shr	.....	.10
Revenue	18,436,000	18,020,000
Spec Cred	a15,000	b37,000
Earnings	(300,000)	198,000

a-From sale of plant and property of discontinued business. b-From tax loss carryforward.

HOW TO RENT A MINICOMPUTER.

1 Just try to find one. Until now, rental companies and minicomputer companies just haven't been very interested. The mini business was built on purchase orders, and it's hard to break old habits.

Rental Electronics, Inc. thinks differently. Of course, that shouldn't surprise anyone. REI is number one in U.S. electronic equipment rental; we've gotten there by specializing in original ideas.

2 Pick the right machine. If you were buying a minicomputer, you'd look for a modern machine with the best price/performance on the market. If you rent or lease, you shouldn't have to settle for anything less. That's why REI went to Data General Corporation when we decided to get into the minicomputer business. The Data General Nova 1200 computer you rent/lease from REI is one of the most modern, popular, and reliable minicomputers available.

3 Pick the right configuration. Rental Electronics offers Nova 1200 computers with up to 32K 16-bit words of core memory, along with standard central processor options and interfaces for peripherals.

4 Think about the peripherals you need. We can supply any standard Nova 1200 peripheral, completely interfaced, and ready to run.

5 Get the software you need. A Nova 1200 from Rental Electronics comes with all the software you'd get if you bought the same machine from Data General. That includes standard things like assembler, editor, loader, debuggers, ALGOL, time-share BASIC, and FORTRAN.

6 Arrange for field service. REI offers full On-Call Service contracts . . . you pay a monthly charge and nothing more. Most important, the computer you rent from REI is serviced by the same Data General staff that has made a reputation as one of the best in the computer business.

7 Arrange the right terms. With a 3-year lease, an 8K Nova 1200 with Teletype (purchase price approximately $9,800) costs less than $250 a month; with a 1-year lease, it's less than $335 a month. The same system, on a month-to-month basis, with maintenance, costs about $784 a month. Or, under a rental-purchase agreement, it's $980 a month, with 80% applied to purchase after 6 months.

8 Call us. We know you can't rent a complex piece of equipment from an ad. Call the nearest Rental Electronics office for more details. Gaithersburg, Maryland (Corporate Headquarters), Tel. 301/948-0620 · Lexington, Massachusetts, Tel. 617/861-0667 · Oakland, New Jersey, Tel. 201/337-3757 · Fort Lauderdale, Florida, Tel. 305/771-3500 · Rosemont, Illinois, Tel. 312/671-2464 · Dallas, Texas, Tel. 214/638-4180 · Palo Alto, California, Tel. 415/328-4525 · Anaheim, California, Tel. 714/879-0561 · Ontario, Canada (PLC Leasing Limited), Tel. 416/677-7513. Or call any Data General office.

9 Or write. Send your name and address to "How to Rent a Minicomputer" Rental Electronics, Inc., 16600 Oakmont Avenue, Gaithersburg, Maryland 20760, and we'll send you our brochure with all the details. We're serious about minicomputers.

R E I

Rental Electronics, Inc.

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Gaithersburg, Maryland 20760